

**Alternatives 3 and 4
Option A**

Bunker Hill

Acid Mine Drainage

Disposal of Raw Sludge in CIA Disposal Beds

Order of Magnitude Cost Opinion (Quantity reduced by 10%)

DATE: 11/22/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Bunte

N. Gulensoy

DESCRIPTION	QTY	QTY Reduced by 10%	UNIT	TOTAL UNIT COST	TOTAL COST
Subgrade Stabilization	10,500	9,450	C. Y.	4.00	\$37,800
Liner Protection Sand	8250	7,425	C. Y.	10.00	\$74,250
Drain Rock	1,950	1,755	C. Y.	18.00	\$31,590
Ditch Lining Geotextile	21,200	19,080	S. Y.	1.65	\$31,482
G C L	18,100	16,290	S. Y.	4.05	\$65,975
H D P E Geomembrane	18,100	16,290	S. Y.	5.40	\$87,966
H D P E Pipe, 10"	550	495	L. F.	23.00	\$11,385
Erosion Control Matting	11800	10,620	S.Y.	1.50	\$15,930
Perf Pipe, 4"	2000	1,800	L. F.	2.00	\$3,600
Perf Pipe, 6"	580	522	L. F.	3.00	\$1,566
HDPE Pipe, 6"	130	117	L. F.	2.50	\$293
Strip Drains	700	630	L. F.	1.75	\$1,103
Valves, 6" Knife Gate	2		Each	700.00	\$1,400
Valves, 10" Knife Gate	6		Each	1,000.00	\$6,000
Air/Vacuum Release Valve	1		Each	2,000.00	\$2,000
Valve Vault	6		Each	1,950.00	\$11,700
Water Tight Manhole	1		Each	3,500.00	\$3,500
Vertical Filtrate Drains	6		Each	4,000.00	\$24,000
Cleanouts	2		Each	750.00	\$1,500
Perimeter Road Embankment (not reduced)	28275	28,275	C. Y.	10	\$282,750
Chain Link Fence and Gates (not reduced)	1000	1,000	L.F.	12	\$12,000
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	15	\$22,500
SUBTOTAL					\$975,539
MISC ALLOWANCE	10%				\$97,554
SUBTOTAL					\$1,073,092
CONTINGENCY	30%				\$321,928
SUBTOTAL					\$1,395,020
MOBILIZATION	15%				\$209,253
CONSTRUCTION TOTAL					\$1,604,273
SALES TAX ON MATERIALS	5.0%				\$25,622
ENGINEERING AND SUPPORT	20%				\$320,855
CONSTRUCTION MANAGEMENT	8%				\$128,342
CAPITAL COST SUBSEQUENT BEDS TOTAL (ROUNDED)					\$2,080,000
ANNUAL O&M COST FOR OPERATING BED				\$42,000	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)					\$518,000
NPV OF INITIAL AND SUBSEQUENT BEDS & CLOSURES CAPITAL COSTS @ 7% INTEREST					\$6,590,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST					\$7,108,000

NOTES:

- Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
- Contingency is for scope changes that are presently unforeseen.
- Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



Alternatives 3 and 4
Option A

Bunker Hill

Acid Mine Drainage

Sludge CIA Disposal Beds - Future Closure Cost

Order of Magnitude Cost Opinion (Quantity reduced by 10%)

DATE: 11/22/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Bunte

N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Sludge Disposal Bed Closure (per each)				
Cell Closure Allowance	3.42	AC	137,500.00	\$470,250
SUBTOTAL				\$470,250
MISC ALLOWANCE	10%			\$47,025
SUBTOTAL				\$517,275
CONTINGENCY	30%			\$155,183
SUBTOTAL				\$672,458
MOBILIZATION	15%			\$100,869
CONSTRUCTION TOTAL				\$773,326
SALES TAX ON MATERIALS	5.0%			\$10,688
ENGINEERING AND SUPPORT	20%			\$154,665
CONSTRUCTION MANAGEMENT	8%			\$61,866
CAPITAL TOTAL (ROUNDED)				\$1,000,000
ANNUAL O&M COST (considered incidental to rest of CIA)			\$0	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.

Contingency is for scope changes that are presently unforeseen.

Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation.

The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



Alternatives 3 and 4
Option A

Bunker Hill
Acid Mine Drainage
Closure of Existing Sludge Pond on CIA
Order of Magnitude Cost Opinion

DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Closure of Existing Sludge Pond on CIA

Cell Closure Allowance	6.50	AC	137,500.00	\$893,750
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SUBTOTAL			\$893,750	\$893,750
MISC ALLOWANCE	10%			\$89,375
SUBTOTAL			\$983,125	\$983,125
CONTINGENCY	30%			\$294,938
SUBTOTAL			\$1,278,063	\$1,278,063
MOBILIZATION	15%			\$191,709
CONSTRUCTION TOTAL			\$1,469,772	\$1,469,772
SALES TAX ON MATERIALS	5.0%			\$20,313
ENGINEERING AND SUPPORT	20%			\$293,954
CONSTRUCTION MANAGEMENT	8%			\$117,582

CAPITAL TOTAL (ROUNDED)				\$1,900,000
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ANNUAL O&M COST (considered incidental to rest of CIA)			\$0	
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NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 5A
Cost Summary**

Alternative 5A Phased Mitigations/Treatment with Plugging of Near-Stream Workings (with CIA Sludge Disposal Beds)		
Interest =	7%	
Remedy Component	Capital Cost (\$)	Annual O&M Cost (\$/yr)
AMD Mitigations	12,060,000	222,000
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	1,950,000	157,000
AMD Treatment	8,198,000	763,000
Sludge Management ¹	6,205,000	38,000
Performance Monitoring ²	0	158,000
Totals	28,753,000	2,539,000
30-Year NPV of O&M		31,507,000
Total 30-Year Present Worth	60,260,000	
¹ The capital cost is the present worth of capital expenditures which occur during the 30-year time period. See the sludge option NPV calculation summary sheet for details. ² The monitoring annual O&M cost is the annualized amount of the 30-year net present value , since annual costs vary over the 30-year period. See the monitoring summary sheet for details.		

AMD Mitigations		
	Capital	O&M
West Fork Milo Creek Diversion	3,590,000	28,000
Rehabilitate Phil Sheridan Diversion	1,250,000	18,000
Plug Drill Holes	150,000	9,000
Plug Small Hopes	360,000	500
Plug/Bypass Inez Shaft	650,000	500
Improve Phil Sheridan Diversion	380,000	500
Sidehill Diversions above Guy Cave	490,000	12,000
South Fork Diversion	1,870,000	30,000
Bypass Bunker Hill Dam	60,000	24,000
Improve Existing Mainstem Milo Diversion, Seal/Decrease Subflow	590,000	99,000
Improve Existing Mainstem Milo Diversion, Increase Capacity	2,670,000	Accounted For Above
Subtotal	12,060,000	222,000
AMD Collection		
	Capital	O&M
Existing In Mine System	0	1,071,000
Subtotal	0	1,071,000
AMD Conveyance		
	Capital	O&M
Existing Concrete Channel	0	25,000
Existing HDPE Pipeline	0	68,000
New HDPE Pipeline to CTP	340,000	37,000
Subtotal	340,000	130,000
AMD Storage		
	Capital	O&M
In-Mine Gravity Diversion System	710,000	Included in Extraction System
New Mine Pool Extraction System	1,240,000	126,000
Existing Lined Pond	0	31,000
Subtotal	1,950,000	157,000
AMD Treatment		
	Capital	O&M
Upgraded 2,500 gpm CTP with Media Filters	8,198,000	763,000
Subtotal	8,198,000	763,000
Sludge Management		
	NPV of Capital	O&M
CIA Sludge Disposal Beds	4,545,000	38,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	6,205,000	38,000
Performance Monitoring		
	Capital	O&M
KT Portal (Years 1 -30)	0	18,000
CTP (Years 1-30)	0	60,000
Surface (Years 1 - 5)	0	30,000
In-Mine (Years 1-5)	0	212,000
Subtotal	0	320,000
	Annualized O&M (Yrs 1-30)	157,969



**Alternative 5B
Cost Summary**

Alternative 5B Phased Mitigations/Treatment with Plugging of Near-Stream Workings (with Mechanical Dewatering and Offsite Sludge Disposal)		
Interest =	7%	
Remedy Component	Capital Cost (\$)	Annual O&M Cost (\$/yr)
AMD Mitigations	12,060,000	222,000
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	1,950,000	157,000
AMD Treatment	8,198,000	763,000
Sludge Management ¹	5,100,000	618,000
Performance Monitoring ²	0	158,000
Totals	27,648,000	3,119,000
30-Year NPV of O&M		38,704,000
Total 30-Year Present Worth	66,352,000	
¹ The capital cost is the present worth of capital expenditures which occur during the 30-year time period. See the sludge option NPV calculation summary sheet for details. ² The monitoring annual O&M cost is the annualized amount of the 30-year net present value , since annual costs vary over the 30-year period. See the monitoring summary sheet for details.		

AMD Mitigations		Capital	O&M
West Fork Milo Creek Diversion		3,590,000	28,000
Rehabilitate Phil Sheridan Diversion		1,250,000	18,000
Plug Drill Holes		150,000	9,000
Plug Small Hopes		360,000	500
Plug/Bypass Inez Shaft		650,000	500
Improve Phil Sheridan Diversion		380,000	500
Sidehill Diversions above Guy Cave		490,000	12,000
South Fork Diversion		1,870,000	30,000
Bypass Bunker Hill Dam		60,000	24,000
Improve Existing Mainstem Milo			
Diversion, Seal/Decrease Subflow		590,000	99,000
Improve Existing Mainstem Milo			
Diversion, Increase Capacity		2,670,000	Accounted For Above
Subtotal		12,060,000	222,000
AMD Collection		Capital	O&M
Existing In Mine System		0	1,071,000
Subtotal		0	1,071,000
AMD Conveyance		Capital	O&M
Existing Concrete Channel		0	25,000
Existing HDPE Pipeline		0	68,000
New HDPE Pipeline to CTP		340,000	37,000
Subtotal		340,000	130,000
AMD Storage		Capital	O&M
In-Mine Gravity Diversion System		710,000	Included in Extraction System
New Mine Pool Extraction System		1,240,000	126,000
Existing Lined Pond		0	31,000
Subtotal		1,950,000	157,000
AMD Treatment		Capital	O&M
Upgraded 2,500 gpm CTP with Media Filters		8,198,000	763,000
Subtotal		8,198,000	763,000
Sludge Management		NPV of Capital	O&M
Mechanical Dewatering System		3,440,000	143,000
Offsite Haulage and Disposal			475,000
Close Existing CIA Disposal Bed (Yr 2)		1,660,000	0
Subtotal		5,100,000	618,000
Performance Monitoring		Capital	O&M
KT Portal (Years 1 -30)		0	18,000
CTP (Years 1-30)		0	60,000
Surface (Years 1 - 5)		0	30,000
In-Mine (Years 1-5)		0	212,000
Subtotal		0	320,000
		Annualized O&M (Yrs 1-30)	157,969



**Alternative 5C
Cost Summary**

Alternative 5C		
Phased Mitigations/Treatment with Plugging of Near-Stream Workings (with Smelter Closure Area Sludge Disposal Beds)		
Interest =	7%	
Remedy Component	Capital Cost (\$)	Annual O&M Cost (\$/yr)
AMD Mitigations	12,060,000	222,000
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	1,950,000	157,000
AMD Treatment	8,198,000	763,000
Sludge Management ¹	10,605,000	62,000
Performance Monitoring ²	0	158,000
Totals	33,153,000	2,563,000
30-Year NPV of O&M		31,804,000
Total 30-Year Present Worth	64,957,000	
¹ The capital cost is the present worth of capital expenditures which occur during the 30-year time period. See the sludge option NPV calculation summary sheet for details. ² The monitoring annual O&M cost is the annualized amount of the 30-year net present value , since annual costs vary over the 30-year period. See the monitoring summary sheet for details.		

AMD Mitigations		
	Capital	O&M
West Fork Milo Creek Diversion	3,590,000	28,000
Rehabilitate Phil Sheridan Diversion	1,250,000	18,000
Plug Drill Holes	150,000	9,000
Plug Small Hopes	360,000	500
Plug/Bypass Inez Shaft	650,000	500
Improve Phil Sheridan Diversion	380,000	500
Sidehill Diversions above Guy Cave	490,000	12,000
South Fork Diversion	1,870,000	30,000
Bypass Bunker Hill Dam	60,000	24,000
Improve Existing Mainstem Milo		
Diversion, Seal/Decrease Subflow	590,000	99,000
Improve Existing Mainstem Milo		
Diversion, Increase Capacity		Accounted For Above
Subtotal	2,670,000	
	12,060,000	222,000
AMD Collection		
	Capital	O&M
Existing In Mine System	0	1,071,000
Subtotal	0	1,071,000
AMD Conveyance		
	Capital	O&M
Existing Concrete Channel	0	25,000
Existing HDPE Pipeline	0	68,000
New HDPE Pipeline to CTP	340,000	37,000
Subtotal	340,000	130,000
AMD Storage		
	Capital	O&M
In-Mine Gravity Diversion System	710,000	Included in Extraction System
New Mine Pool Extraction System	1,240,000	126,000
Existing Lined Pond	0	31,000
Subtotal	1,950,000	157,000
AMD Treatment		
	Capital	O&M
Upgraded 2,500 gpm CTP with Media Filters	8,198,000	763,000
Subtotal	8,198,000	763,000
Sludge Management		
	NPV of Capital	O&M
Smelter Closure Area Sludge Disposal Beds	8,945,000	62,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	10,605,000	62,000
Performance Monitoring		
	Capital	O&M
KT Portal (Years 1 -30)	0	18,000
CTP (Years 1-30)	0	60,000
Surface (Years 1 - 5)	0	30,000
In-Mine (Years 1-5)	0	212,000
Subtotal	0	320,000
	Annualized O&M (Yrs 1-30)	157,969



**Alternative 5D
Cost Summary**

Alternative 5D Phased Mitigations/Treatment with Plugging of Near-Stream Workings (with CIA Sludge Drying Beds and Smelter Closure Area Landfill)		
Interest = 7%		
Remedy Component	Capital Cost (\$)	Annual O&M Cost (\$/yr)
AMD Mitigations	12,060,000	222,000
AMD Collection	0	1,071,000
AMD Conveyance	340,000	130,000
AMD Storage	1,950,000	157,000
AMD Treatment	8,198,000	763,000
Sludge Management ¹	8,821,000	129,000
Performance Monitoring ²	0	158,000
Totals	31,369,000	2,630,000
30-Year NPV of O&M		32,636,000
Total 30-Year Present Worth	64,005,000	

¹The capital cost is the present worth of capital expenditures which occur during the 30-year time period. See the sludge option NPV calculation summary sheet for details.

²The monitoring annual O&M cost is the annualized amount of the 30-year net present value, since annual costs vary over the 30-year period. See the monitoring summary sheet for details.

AMD Mitigations		
	Capital	O&M
West Fork Milo Creek Diversion	3,590,000	28,000
Rehabilitate Phil Sheridan Diversion	1,250,000	18,000
Plug Drill Holes	150,000	9,000
Plug Small Hopes	360,000	500
Plug/Bypass Inez Shaft	650,000	500
Improve Phil Sheridan Diversion	380,000	500
Sidehill Diversions above Guy Cave	490,000	12,000
South Fork Diversion	1,870,000	30,000
Bypass Bunker Hill Dam	60,000	24,000
Improve Existing Mainstem Milo		
Diversion, Seal/Decrease Subflow	590,000	99,000
Improve Existing Mainstem Milo		
Diversion, Increase Capacity	2,670,000	Accounted For Above
Subtotal	12,060,000	222,000
AMD Collection		
	Capital	O&M
Existing In Mine System	0	1,071,000
Subtotal	0	1,071,000
AMD Conveyance		
	Capital	O&M
Existing Concrete Channel	0	25,000
Existing HDPE Pipeline	0	68,000
New HDPE Pipeline to CTP	340,000	37,000
Subtotal	340,000	130,000
AMD Storage		
	Capital	O&M
In-Mine Gravity Diversion System	710,000	Included in Extraction System
New Mine Pool Extraction System	1,240,000	126,000
Existing Lined Pond	0	31,000
Subtotal	1,950,000	157,000
AMD Treatment		
	Capital	O&M
Upgraded 2,500 gpm CTP with Media Filters	8,198,000	763,000
Subtotal	8,198,000	763,000
Sludge Management		
	NPV of Capital	O&M
Smelter Closure Area Landfill	5,523,000	86,000
Landfill Closure (Yr 31)	223,000	0
CIA Sludge Drying Beds	1,415,000	43,000
Close Existing CIA Disposal Bed (Yr 2)	1,660,000	0
Subtotal	8,821,000	129,000
Performance Monitoring		
	Capital	O&M
KT Portal (Years 1 -30)	0	18,000
CTP (Years 1-30)	0	60,000
Surface (Years 1 - 5)	0	30,000
In-Mine (Years 1-5)	0	212,000
Subtotal	0	320,000
	Annualized O&M (Yrs 1-30)	157,969



Bunker Hill
AMD Mitigation Concepts
2.1: West Fork Diversion
Order of Magnitude Cost Opinion

DATE: 08/24/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin
T. Pyle

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Site Access Road					
Clear & Grub New Road	3,500	LF	8.62	\$30,153	asm 30'w & 50'/hour
Grade, Fill & Compact New Road	3,500	LF	76.32	\$267,137	encounter rock
Base Course on New Road	1,296	CY	24.92	\$32,307	
Grade & Improve Existing Road	400	LF	28.90	\$11,559	
Erosion & Sedimentation Control	1	LS	47,054.48	\$47,054	\$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
Diversion Structure					
Diversion/Care of Water	1	LS	10,000.00	\$10,000	
Excavate for Sheetpile Dam	1,800	CY	17.23	\$31,014	
Native Backfill Around Sheetpiles	1,800	CY	13.30	\$23,940	
Sheetpile Wall for Cutoff	2,250	SF	30.00	\$67,500	
Excavate for Screen Structure	70	CY	17.23	\$1,206	
Native Backfill Around Screen Structure	20	CY	13.30	\$266	
Backfill Riprap Overflow Spillway	325	CY	39.95	\$12,984	
Construct Screen Intake Structure	15	CY	552.24	\$8,284	
Construct Transition Structure	15	CY	552.24	\$8,284	
Foundation Grout Curtain	1,500	LF	40.00	\$60,000	Includes diamond drilling, grout pipe, pressure testing, etc.
Bar Screen	1	LS	10,329.99	\$10,330	
Collector Pipe & Gabions					
Excavation	300	CY	17.23	\$5,169	
Imported Bed, Zone & Backfill	250	CY	31.62	\$7,906	
Waste	300	CY	3.29	\$986	
36" Perf. Collector Pipe	200	LF	68.62	\$13,724	
Regrade Stream	1	LS	20,676.10	\$20,676	
Gabion Sediment Traps	50	CY	183.25	\$9,162	
Pipeline & Access Road					
36" Pipeline in Imp Road	750	LF	127.24	\$95,430	including earthwork & fittings
30" Pipeline in New Road	750	LF	117.24	\$87,928	including earthwork & fittings
36" Pipeline in Unimp Road	1,700	LF	241.71	\$410,912	including earthwork & fittings
36" Overland Pipe	150	LF	214.48	\$32,171	including earthwork, supports & fittings
42" Slip Pipe for Overland Pipe	40	LF	127.24	\$5,090	including earthwork, supports & fittings
Anchor Block	2	EA	4,061.89	\$8,124	asm 6cy & 5hrs to form, rebar, place
Anchor Fitting	2	EA	1,172.38	\$2,345	allowance
Slip Joint Gasket	1	EA	1,186.19	\$1,186	based on quote for Lake Tapps outfall
Thrust Block	7	EA	822.38	\$5,757	
Air Vent	2	EA	586.19	\$1,172	
Cut-Off Trench Seepage Walls	30	EA	2,100.00	\$63,000	asm 7cy @ \$300/cy
22 1/2 Degree Elbow	10	EA	2,572.38	\$25,724	
Bureau of Reclamation Stilling Basin					
Structure Complete	4	LS	67,230.08	\$268,920	based on Lake Tapps design & estimate
SUBTOTAL				\$1,687,400	
MISC ALLOWANCE				10%	\$168,740
SUBTOTAL					\$1,856,140
CONTINGENCY				30%	\$556,842
SUBTOTAL					\$2,412,983
MOBILIZATION				15%	\$361,947
CONSTRUCTION TOTAL					\$2,774,930
SALES TAX ON MATERIALS				5.0%	\$33,487
ENGINEERING AND SUPPORT				20%	\$554,986
CONST MANAGEMENT				8%	\$221,994
CAPITAL TOTAL (ROUNDED)					\$3,590,000
ANNUAL O&M COST			\$27,700		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)					\$344,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST					\$3,934,000

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
<u>Annual Costs</u>							
Inspection	1	YR	0	1,600	320	\$1,920	asm 4 times/year & 8hrs/time @ \$50/hr labor & \$10 for pickup
Road Maintenance & Repairs	1	YR	1,000	4,477	2,016	\$7,493	asm 3 time/year & 8hrs/time + material allowance
Pipeline & Structure Maint. & Repairs	1	YR	2,000	7,448	6,336	\$15,784	asm 4 times/year & 8hrs/time + material allowance
						\$25,197	
						\$2,520	
Contingency	10%						
Total Annual Cost						\$27,717	



Bunker Hill
 AMD Mitigation Concepts
 2.2.1: Rehabilitate Phil Sheridan Diversion
 Order of Magnitude Cost Opinion

DATE: 08/24/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin
 T. Pyle

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Open Phil Sheridan Raises					
Site Access Road					
Grade & Improve Existing Road	200	LF	28.90	\$5,779	
Erosion & Sedimentation Control	1	LS	5,328.72	\$5,329	\$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
Raise #1					
Open Up Raise #1	100	CY	107.69	\$10,769	
Sink 6' Casing from Surface to Rock Line	25	LF	228.92	\$5,723	
Prefabricated Steel Inlet Structure	1	LS	10,000.00	\$10,000	
Native Backfill Around Screen Structure	100	CY	17.23	\$1,723	
Place Riprap	100	CY	26.65	\$2,665	
Raise #2					
Open Up Raise #2	100	CY	107.69	\$10,769	
Sink 10' Casing from Surface to Rock Line	25	CY	2,500.00	\$62,500	
Native Backfill Around Screen Structure	100	CY	17.23	\$1,723	
Construct Screen Intake Structure	20	CY	500.90	\$10,018	
Screens for Inlet Structure	2	LS	10,659.98	\$21,320	
Regrade Stream	1	LS	10,338.05	\$10,338	
Place Riprap	100	CY	26.65	\$2,665	
Drift Construction					
Site Access Road					
Clear & Grub New Road for Access	150	LF	8.62	\$1,292	
Grade, Fill & Compact New Road	150	LF	76.32	\$11,449	\$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
Base Course on New Road	56	CY	24.92	\$1,385	
Erosion & Sedimentation Control	1	LS	7,410.90	\$7,411	
Proposed Drift Construction					
Drift Advancement	300	LF	500.00	\$150,000	Based on costs provided by Bill Hudson
Access Road and Staging Area	1	LS	15,000.00	\$15,000	Based on costs provided by Bill Hudson
Diversion/Care of Water	1	LS	20,000.00	\$20,000	
Bulkhead/Bracing for new portal area	1	LS	25,000.00	\$25,000	
Concrete Collar with Steel Bulkhead Dam	8	CY	566.25	\$4,530	
HDPE Diversion Pipeline					
42" HDPE Pipeline in adit	300	LF	264.48	\$79,343	including supports & fittings
36" HDPE buried in Unimp Road	100	LF	241.71	\$24,171	including earthwork & fittings
Anchor Block	2	EA	4,061.89	\$8,124	asm 6cy & 5hrs to form, rebar, place
Cut-Off Trench Seepage Walls	1	EA	2,100.00	\$2,100	asm 7cy @ \$500/cy
Concentric Reducer 42" by 36"	1	EA	2,572.38	\$2,572	
SUBTOTAL				\$513,697	
MISC ALLOWANCE	10%			\$51,370	
SUBTOTAL				\$565,067	
CONTINGENCY	50%			\$282,534	
SUBTOTAL				\$847,601	
MOBILIZATION	15%			\$127,140	
CONSTRUCTION TOTAL				\$974,741	
SALES TAX ON MATERIALS	5.0%			\$1,710	
ENGINEERING AND SUPPORT	20%			\$194,948	
CONST MANAGEMENT	8%			\$77,979	
CAPITAL TOTAL (ROUNDED)				\$1,250,000	
ANNUAL O&M COST			\$18,200		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$226,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$1,476,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
 Contingency is for scope changes that are presently unforeseen.
 Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	1	YR	0	1,800	240	\$2,040	asm 3 times/year & 8hrs/time @ \$50/hr labor & \$10 for pickup
Road Maintenance & Repairs	1	YR	1,000	1,492	672	\$3,164	asm 1 time/year & 8hrs/time + material allowance
Pipeline & Structure Maint. & Repairs	1	YR	1,000	5,586	4,752	\$11,338	asm 3 times/year & 8hrs/time + material allowance
						\$16,542	
Contingency	10%					\$1,654	
Total Annual Cost						\$18,197	

Plug Holes

Bunker Hill

AMD Mitigation Concepts

6.1: Plug Drill Holes

Order of Magnitude Cost Opinion

DATE: 08/24/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Plug Holes					
Tunnel Clearing	1	LS	10,822.00	\$10,822	2 week w/4 man crew & equipment
Add anchor flange for high pressure hole	1	LS	10,000.00	\$10,000	
Plug Low Pressure Hole	20	EA	1,392.64	\$27,853	1 day w/ 3 man crew
Plug High Pressure Hole	1	EA	22,926.40	\$22,926	
SUBTOTAL				\$71,601	
MISC ALLOWANCE	10%			\$7,160	
SUBTOTAL				\$78,761	
CONTINGENCY	30%			\$23,628	
SUBTOTAL				\$102,390	
MOBILIZATION	15%			\$15,358	
CONSTRUCTION TOTAL				\$117,748	
SALES TAX ON MATERIALS	5.0%			\$600	
ENGINEERING AND SUPPORT	20%			\$23,550	
CONST MANAGEMENT	8%			\$9,420	
CAPITAL TOTAL (ROUNDED)				\$150,000	
ANNUAL O&M COST			\$9,200		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$114,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$264,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.

Contingency is for scope changes that are presently unforeseen.

Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

Holes O&M

O & M COST ESTIMATE DETAILS

Tasks	Qty		Unit Cost	Total Cost	Comments
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Annual Costs

Packer Inspection and Maintenance	21	Each	400	\$8,400	\$400/hole @ 21 holes
				\$8,400	
Contingency	10%			\$840	
Total Annual Cost				\$9,240	

Bunker Hill
 AMD Mitigation Concepts
 4.1: Plug Small Hopes (SH) Drift
 Order of Magnitude Cost Opinion

DATE: 08/24/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Plug Shaft					
Survey to Determine Location of SH Drift	1	LS	1,600.00	\$1,600	
Install New Access Shaft to SH Drift	1	LS	10,000.00	\$10,000	
Clean Out SH Drift & Find 2-Raises to Level 5	1	LS	51,690.24	\$51,690	
Clean Out Min. of 16 Feet of Shafts to 5 Level	1	LS	10,338.05	\$10,338	
Prepare for Plug	2	EA	5,319.96	\$10,640	
Concrete Plug	60	CY	272.30	\$16,338	
Construct Bulkhead Each End of SH Drift	2	EA	3,398.96	\$6,798	400bf each @ 1.50/bf * 8hrs to install
Transport Mix to Pump Site	400	CY	3.29	\$1,315	
Fill all Bulkheaded Areas w/Sand/Cement	400	CY	83.05	\$33,222	add for mixing as in Cherry, etc
Remove/Backfill Access Shaft	1	LS	2,659.98	\$2,660	
Replace Culvert Under Road	1	LS	3,546.02	\$3,546	
SUBTOTAL				\$148,147	
MISC ALLOWANCE	10%			\$14,815	
SUBTOTAL				\$162,962	
CONTINGENCY	50%			\$81,481	
SUBTOTAL				\$244,443	
MOBILIZATION	15%			\$36,666	
CONSTRUCTION TOTAL				\$281,109	
SALES TAX ON MATERIALS	5.0%			\$1,365	
ENGINEERING AND SUPPORT	20%			\$56,222	
CONST MANAGEMENT	8%			\$22,489	
CAPITAL TOTAL (ROUNDED)				\$360,000	
ANNUAL O&M COST			\$500		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$6,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$366,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.

Contingency is for scope changes that are presently unforeseen.

Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
<u>Annual Costs</u>							
Inspection	1	YR	0	400	80	\$480	asm 1 times/year & 8hrs/time @ \$50/hr labor & \$10 for pickup
Road Maintenance & Repairs	1	YR	0	0	0	\$0	
Pipeline & Structure Maint. & Repairs	1	YR	0	0	0	\$0	
						\$480	
Contingency	10%					\$48	
Total Annual Cost						\$528	



Bunker Hill
AMD Mitigation Concepts
5.1: Plug/Bypass Inez Shaft

DATE: 08/24/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

Order of Magnitude Cost Opinion

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Plug Shaft					
Survey to Determine Location of Shaft	1	LS	3,200.00	\$3,200	
Provide 2000' of 15' wide access road	2,000	LF	25.00	\$50,000	
Excavate to Find Location	1	LS	51,690.24	\$51,690	15 days
Sheetpiles	2,700	SF	21.65	\$58,455	
Excavate to Top of Rock	555	CY	34.46	\$19,125	
Backfill Excavation	555	CY	13.30	\$7,381	
Prepare for Plug	1	LS	5,319.96	\$5,320	
Excavate & Waste 16' of Shaft	30	CY	258.45	\$7,754	largely handwork
Concrete Plug	30	CY	143.08	\$4,292	
Hydroseed all disturbed areas	60,000	SF	0.10	\$6,000	
Regrade Stream	1	LS	51,690.24	\$51,690	
SUBTOTAL				\$264,908	
MISC ALLOWANCE	10%			\$26,491	
SUBTOTAL				\$291,399	
CONTINGENCY	50%			\$145,699	
SUBTOTAL				\$437,098	
MOBILIZATION	15%			\$65,565	
CONSTRUCTION TOTAL				\$502,663	
SALES TAX ON MATERIALS	5.0%			\$2,175	
ENGINEERING AND SUPPORT	20%			\$100,533	
CONST MANAGEMENT	8%			\$40,213	
CAPITAL TOTAL (ROUNDED)				\$650,000	
ANNUAL O&M COST			\$500		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$6,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$656,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
<u>Annual Costs</u>							
Inspection	1	YR	0	400	80	\$480	asm 1 times/year & 8hrs/time @ \$50/hr labor & \$10 for pickup
Road Maintenance & Repairs	1	YR	0	0	0	\$0	
Pipeline & Structure Maint. & Repairs	1	YR	0	0	0	\$0	asm 2 times/year & 8hrs/time + material allowance
						\$480	
Contingency	10%					\$48	
Total Annual Cost						\$528	

Bunker Hill
 AMD Mitigation Concepts
 2.2.2: Improve Phil Sheridan Diversion Rehabilitation
 Order of Magnitude Cost Opinion

DATE: 08/24/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin
 T. Pyle

DESCRIPTION	QTY	TOTAL UNIT COST	TOTAL COST	COMMENTS
Foundation Grout Curtain	1,500	40.00	\$60,000	
Sheetpile Wall for Cutoff	3,000	30.00	\$90,000	
Dig/Drill/Install Collection Drains for Groundwater	50	120.00	\$6,000	
SUBTOTAL			\$156,000	
MISC ALLOWANCE	10%		\$15,600	
SUBTOTAL			\$171,600	
CONTINGENCY	50%		\$85,800	
SUBTOTAL			\$257,400	
MOBILIZATION	15%		\$38,610	
CONSTRUCTION TOTAL			\$296,010	
SALES TAX ON MATERIALS	5.0%		\$1,925	
ENGINEERING AND SUPPORT	20%		\$59,202	
CONST MANAGEMENT	8%		\$23,681	
CAPITAL TOTAL (ROUNDED)			\$380,000	
ANNUAL O&M COST		\$500		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)			\$6,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST			\$386,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
 Contingency is for scope changes that are presently unforeseen.
 Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



Bunker Hill
 AMD Mitigation Concepts
 2.3: Sidehill Diversion above Guy Cave
 Order of Magnitude Cost Opinion

DATE: 08/24/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Access Roads					
Clear & Grub	940	LF	8.62	\$8,098	asm 30'w & 50'/hour
Grade, Fill & Compact	940	LF	76.32	\$71,745	60% rock
Crushed Surfacing Base Course	348	CY	21.65	\$7,537	
Erosion matting & mulch on all disturbed cut slopes	47,000	SF	1.00	\$47,000	jute mat & hydroseed-allow
Ditch Lining System	940	LF	47.90	\$45,024	
Construct Screen Intake Structure	20	CY	500.90	\$10,018	
Erosion & Sedimentation Control	1	LS	9,400.00	\$9,400	\$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
SUBTOTAL				\$198,823	
MISC ALLOWANCE	10%			\$19,882	
SUBTOTAL				\$218,705	
CONTINGENCY	50%			\$109,352	
SUBTOTAL				\$328,057	
MOBILIZATION	15%			\$49,209	
CONSTRUCTION TOTAL				\$377,266	
SALES TAX ON MATERIALS	5.0%			\$2,306	
ENGINEERING AND SUPPORT	20%			\$75,453	
CONST MANAGEMENT	8%			\$30,181	
CAPITAL TOTAL (ROUNDED)				\$490,000	
ANNUAL O&M COST			\$11,700		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$145,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$635,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
 Contingency is for scope changes that are presently unforeseen.
 Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



Sidehill O&M

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	1	YR	0	400	80	\$480	asm 1 time/year & 8hrs/time @ \$50/hr labor & \$10 for pickup
Road Maintenance & Repairs	1	YR	500	4,477	2,016	\$6,993	asm 13time/year & 8hrs/time + material allowance
Pipeline & Structure Maint. & Repairs	1	YR	0	0	3,168	\$3,168	asm 1 times/year & 8hrs/time + material allowance
						\$10,641	
Contingency	10%					\$1,064	
Total Annual Cost						\$11,705	



Bunker Hill
AMD Mitigation Concepts
3.1: South Fork Diversion
Order of Magnitude Cost Opinion

DATE: 08/24/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Site Access Road					
Clear & Grub New Road	1,330	LF	8.62	\$11,458	asm 30'w & 50'/hour
Grade, Fill & Compact New Road	1,330	LF	38.16	\$50,756	
Base Course on New Road	493	CY	24.92	\$12,277	
Grade & Improve Existing Road	800	LF	28.90	\$23,118	
Erosion & Sedimentation Control	1	LS	41,643.58	\$41,644	\$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
Diversion Structure					
Diversion/Care of Water	1	LS	10,000.00	\$10,000	
Excavate for Sheetpile Dam	900	CY	17.23	\$15,507	
Native Backfill Around Sheetpiles	900	CY	13.30	\$11,970	
Sheetpile Wall for Cutoff	1,100	SF	30.00	\$33,000	
Excavate for Screen Structure	70	CY	17.23	\$1,206	
Native Backfill Around Screen Structure	20	CY	13.30	\$266	
Backfill Riprap Overflow Spillway	325	CY	39.95	\$12,984	
Construct Screen Intake Structure	15	CY	552.24	\$8,284	
Construct Transition Structure	15	CY	552.24	\$8,284	
Foundation Grout Curtain	750	LF	40.00	\$30,000	
Bar Screen	1	LS	10,329.99	\$10,330	
Collector Pipe & Gabions					
Excavation	300	CY	17.23	\$5,169	
Imported Bed, Zone & Backfill	250	CY	31.62	\$7,906	
Waste	300	CY	3.29	\$986	
36" Perf. Collector Pipe	200	LF	68.62	\$13,724	
Regrade Stream	1	LS	20,676.10	\$20,676	
Gabion Sediment Traps	50	CY	183.25	\$9,162	
Pipeline & Access Road					
36" Pipeline in Imp Road	850	LF	127.24	\$108,152	including earthwork & fittings
36" Pipeline in New Road	1,350	LF	127.24	\$171,771	including earthwork & fittings
Stream Crossing	1	EA	4,579.02	\$4,579	
Thrust Block	1	EA	822.38	\$822	
Air Vent	3	EA	586.19	\$1,759	
Cut-Off Trench Seepage Walls	22	EA	2,100.00	\$46,200	asm 7cy @ \$300/cy
Thrust Block	2	EA	3,789.51	\$7,579	
Bureau of Reclamation Stilling Basin					
Structure Complete	2	LS	67,230.08	\$134,460	based on Lake Tapps design & estimate
SUBTOTAL				\$814,028	
MISC ALLOWANCE				\$81,403	
SUBTOTAL				\$895,431	
CONTINGENCY				\$358,173	
SUBTOTAL				\$1,253,604	
MOBILIZATION				\$188,041	
CONSTRUCTION TOTAL				\$1,441,644	
SALES TAX ON MATERIALS				\$20,664	
ENGINEERING AND SUPPORT				\$288,329	
CONST MANAGEMENT				\$115,332	
CAPITAL TOTAL (ROUNDED)				\$1,870,000	
ANNUAL O&M COST			\$29,900		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$371,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$2,241,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



S Fork O&M

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
<u>Annual Costs</u>							
Inspection	1	YR	0	3,200	320	\$3,520	asm 8 times/year & 8hrs/time @ \$50/hr labor & \$10 for pickup
Road Maintenance & Repairs	1	YR	1,000	3,724	3,168	\$7,892	asm 1 time/year & 8hrs/time + material allowance
Pipeline & Structure Maint. & Repairs	1	YR	2,000	7,448	6,336	\$15,784	asm 4 times/year & 8hrs/time + material allowance
						\$27,196	
Contingency	10%					\$2,720	
Total Annual Cost						\$29,916	

Bunker Hill
 AMD Mitigation Concepts
 4.2: Bypass Bunker Hill Reservoir
 Order of Magnitude Cost Opinion

DATE: 08/24/2000
 PROJECT NO.: 152215.FS.02
 ESTIMATE BY: D. Hedglin
 T.Pyle

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Modify Outlet Works	1	LS	15,000.00	\$15,000	
New Pipeline and Connection	1	LS	15,000.00	\$15,000	
SUBTOTAL				\$30,000	
MISC ALLOWANCE	10%			\$3,000	
SUBTOTAL				\$33,000	
CONTINGENCY	30%			\$9,900	
SUBTOTAL				\$42,900	
MOBILIZATION	15%			\$6,435	
CONSTRUCTION TOTAL				\$49,335	
SALES TAX ON MATERIALS	5.0%			\$0	
ENGINEERING AND SUPPORT	20%			\$9,867	
CONST MANAGEMENT	8%			\$3,947	
CAPITAL TOTAL (ROUNDED)				\$60,000	
ANNUAL O&M COST			\$24,300		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$302,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$362,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
 Contingency is for scope changes that are presently unforeseen.
 Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
<u>Annual Costs</u>							
Inspection	1	YR	0	400	80	\$480	asm 1 times/year & 8hrs/time @ \$50/hr labor & \$10 for pickup
Road Maintenance & Repairs	1	YR	0	0	0	\$0	
Pipeline & Structure Maint. & Repairs	1	YR	0	11,700	9,900	\$21,600	asm 3 times/year & 8hrs/time + material allowance
						\$22,080	
Contingency	10%					\$2,208	
Total Annual Cost						\$24,288	



Bunker Hill

DATE: 08/24/2000

AMD Mitigation Concepts

PROJECT NO.: 152215.FS.02

4.3: Improve Existing Diversions (Improve Seal, Decrease Weir Overflow)

Order of Magnitude Cost Opinion

ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Modifications to Existing Diversion Structure					
Diversion/Care of Water	1	LS	20,000.00	\$20,000	
Excavate for New Structure	150	CY	17.23	\$2,585	
Native Backfill Around Structure	60	CY	13.30	\$798	
Raise Existing Spillway on Dam	1	LS	23,299.89	\$23,300	allowance
Excavate for Screen Structure	70	CY	17.23	\$1,206	
Native Backfill Around Screen Structure	20	CY	13.30	\$266	
Backfill Riprap Overflow Spillway	325	CY	39.95	\$12,984	
Construct Screen Intake Structure	45	CY	552.24	\$24,851	
Construct Transition Structure	30	CY	552.24	\$16,567	
Bar Screen	1	LS	22,659.98	\$22,660	
Foundation Grout Curtain	1,500	LF	40.00	\$60,000	
Excavation	833	CY	17.23	\$14,358	
Gravel pad for concrete pad	50	CY	20.00	\$1,000	
Concrete base pad, 8+ thick	70	CY	300.00	\$21,000	
Riprap Cover	625	CY	28.62	\$17,884	
SUBTOTAL				\$239,459	
MISC ALLOWANCE	10%			\$23,946	
SUBTOTAL				\$263,405	
CONTINGENCY	50%			\$131,703	
SUBTOTAL				\$395,108	
MOBILIZATION	15%			\$59,266	
CONSTRUCTION TOTAL				\$454,374	
SALES TAX ON MATERIALS	5.0%			\$5,113	
ENGINEERING AND SUPPORT	20%			\$90,875	
CONST MANAGEMENT	8%			\$36,350	
CAPITAL TOTAL (ROUNDED)				\$590,000	
ANNUAL O&M COST			\$99,300		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$1,232,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$1,822,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.

Contingency is for scope changes that are presently unforeseen.

Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
<u>Annual Costs</u>							
Inspection	1	YR	0	1,600	320	\$1,920	asm 4 times/year & 8hrs/time @ \$50/hr labor & \$10 for pickup
Road Maintenance & Repairs	1	YR	0	1,492	672	\$2,164	asm 1 time/year & 8hrs/time + material allowance
Pipeline & Structure Maint. & Repairs	1	YR	0	46,550	39,600	\$86,150	asm 12 times/year & 8hrs/time + material allowance
						\$90,235	
Contingency	10%					\$9,023	
Total Annual Cost						\$99,258	

Bunker Hill

AMD Mitigation Concepts

4.4: Improve Existing Diversion (Increase Pipeline Capacity)

Order of Magnitude Cost Opinion

DATE: 08/24/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
New Pipeline					
Clear & Grub New Road	1,330	LF	8.62	\$11,458	asm 30'w & 50'/hour
Grade, Fill & Compact New Road	1,330	LF	38.16	\$50,756	
Base Course on New Road	493	CY	24.92	\$12,277	
Erosion & Sedimentation Control	1	LS	41,643.58	\$41,644	\$/LF allowance for ditches, culverts, silt fences, sed ponds, etc
54" Pipeline in New Road	1,400	LF	218.69	\$306,159	including earthwork & fittings
Remove & Dispose of 36" CMP Pipe	1,400	LF	8.59	\$12,020	earthwork included above, remove, haul to disposal site, dispose
Thrust Block	1	EA	3,789.51	\$3,790	
Air Vent	1	EA	1,286.19	\$1,286	
Cut-off Trench Seepage Walls	14	EA	3,200.00	\$44,800	
Modifications to Existing Diversion Structure					
Diversion/Care of Water	1	LS	20,000.00	\$20,000	
Excavate for New Structure	150	CY	17.23	\$2,585	
Native Backfill Around Structure	60	CY	13.30	\$798	
Raise Existing Spillway on Dam	1	LS	23,299.89	\$23,300	
Excavate for Screen Structure	70	CY	17.23	\$1,206	
Native Backfill Around Screen Structure	20	CY	13.30	\$266	
Backfill Riprap Overflow Spillway	325	CY	39.95	\$12,984	
Construct Screen Intake Structure	45	CY	552.24	\$24,851	
Construct Transition Structure	30	CY	552.24	\$16,567	
Bar Screen	1	LS	22,659.98	\$22,660	
Foundation Grout Curtain	1,500	LF	40.00	\$60,000	
Excavation	833	CY	17.23	\$14,358	
Gravel pad for concrete pad	50	CY	20.00	\$1,000	
Concrete base pad, 8+ thick	70	CY	300.00	\$21,000	
Sheetpile Wall for Cutoff	2,250	SQ	30.00	\$67,500	
Native Backfill around Sheetpiles	1,800	CY	13.30	\$23,940	
Riprap Cover	625	CY	28.62	\$17,884	
Collector Pipe & Gabions					
Excavation	675	CY	17.23	\$11,630	
Imported Bed, Zone & Backfill	563	CY	31.62	\$17,789	
Waste	675	CY	3.29	\$2,220	
36" Perf. Collector Pipe	450	LF	68.62	\$30,878	
Regrade Stream	1	LS	30,152.64	\$30,153	
Gabion Sediment Traps	150	CY	183.25	\$27,487	
Bureau of Reclamation Stilling Basin					
Structure Complete	1	LS	151,690.24	\$151,690	
SUBTOTAL				\$1,086,936	
MISC ALLOWANCE				10%	\$108,694
SUBTOTAL					\$1,195,630
CONTINGENCY				50%	\$597,815
SUBTOTAL					\$1,793,445
MOBILIZATION				15%	\$269,017
CONSTRUCTION TOTAL					\$2,062,461
SALES TAX ON MATERIALS				5.0%	\$26,794
ENGINEERING AND SUPPORT				20%	\$412,492
CONST MANAGEMENT				8%	\$164,997
CAPITAL TOTAL (ROUNDED)					\$2,670,000
ANNUAL O&M COST			\$99,300		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$1,232,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$3,902,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.

Contingency is for scope changes that are presently unforeseen.

Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.



Existing Collection Costs

Existing Mine Water Collection System O&M Costs

	Qty	Unit	Total Unit Cost	Total Cost	Comments
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Annual Costs

					Weekly cost based on estimate of existing mine owner incurred cost. Includes a crew of a foreman, hoistman, backup hoistman, and 3-man repair crew. Total labor at \$4,410/week and a benefits package at \$1,760/week = \$6,170/week total
Mine Operation Labor	52	Week		\$320,840	
Power	12	Month		\$102,000	Power cost estimated for existing mine operations
Level Repair and Maintenance	1	Year	81,000	\$81,000	9, 10, and 11 level areas necessary for mine water control
Compressor Maintenance	1	Year	20,000	\$20,000	Compressor maintenance costs
Hoist Maintenance	1	Year	160,000	\$160,000	Cherry Hoist, #2 Hoist, and #1 Temporary Hoist
Pumps and Pipe Columns	1	Year	100,000	\$100,000	Maintenance of mine dewatering pumps in #2 Shaft, #1 Shaft, 9 Level
Electrical System Maintenance	1 Year		40,000	\$40,000	Pumps, and piping
Subtotal				\$823,840	
Contingency	15%			\$123,576	15% contingency for repairs and maintenance
Allowance	15%			\$123,576	15% allowance for unaccounted for costs
Total Annual Cost				\$1,070,992	

KT Portal Channel O&M

KT Portal Channel and Flume Cleaning Costs

	Qty	Unit	Total Unit Cost	Total Cost	Comments
Annual Costs					
Inspection and Cleanout	12	Month	1,875	\$22,500	Based on USACE cost of \$1,875/month for existing cleanout work
Contingency	10%			\$2,250	
Total Annual Cost				\$24,750	

Existing Pipeline O&M

Existing 20-Inch HDPE Pipeline from Mine Yard to Lined Pond O&M Costs

	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	2	Each	0	674	288	\$1,924	2 times/year & 4hrs/time each with 2 laborers with pickup
Pigging	2	Each				\$56,000	2 times per year at \$28,000 each lump sum based on the USACE estimate
Camera	2	YR	2,000			\$4,000	of 8/1/00 for the pipeline from mine yard to lined pond
						\$61,924	2 times/year (subcontracted out)
Contingency	10%					\$6,192	
Total Annual Cost						\$68,116	

Notes

Camera costs = 1,000/day times 2 days each time (Big Sky Industrial 509/624-4949)



Bunker Hill
Future Pipeline to CTP
Order of Magnitude Cost Opinion

DATE: 03/03/2000
PROJECT NO.: 152215.RS.06
ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Pigging/Camera Station					
818 LA Utility Vault Company Vault (8 feet deep)	1	EA	4,584.51	\$4,585	
30 degree SDR 17 HDPE (wrapped in fiberglass)	1	EA	3,072.38	\$3,072	
20-inch ORBE knife-gate valve	1	EA	6,572.38	\$6,572	
Link-Seals	2	EA	1,072.38	\$2,145	
Electrofusion couplers	2	EA	1,472.38	\$2,945	
Stainless steel flanges	2	EA	3,572.38	\$7,145	
Pig Launching Station (see pipeline O&M plan)	1	EA	8,144.75	\$8,145 based on past estimate	
Pipeline					
20-inch diameter SDR 17 HDPE	800	LF	52.90	\$42,316	R2-38
Excavation	1,312	CY	8.62	\$11,301	5' of cover, utility obstructions, concrete debris, etc
Bed & Zone	397	CY	31.62	\$12,541	
Native Backfill	847	CY	13.30	\$11,258	
Waste	465	CY	4.93	\$2,295	
Remove & Dispose of Box Culvert (Asbestos)	1	LS	6,892.03	\$6,892	allow 2 days & local disposal
Tee connection to 24-inch existing line	1	EA	6,579.02	\$6,579	cut, fab tee, install
McKinley Avenue paved road crossing (standard 2 lane road with shoulders)	1	LS	800.00	\$800	28'x 13' @ @20/sy
Bunker Creek Crossing (assume 20 feet wide)	1	LS	5,307.52	\$5,308	cofferdams, temp diversion, dewatering, open cut, etc
Electrofusion couplers	5	EA	1,472.38	\$7,362	
Stainless steel flanges	5	EA	3,572.38	\$17,862	
SUBTOTAL				\$159,121	
MISC ALLOWANCE	10%			\$15,912	
SUBTOTAL				\$175,033	
CONTINGENCY	30%			\$52,510	
SUBTOTAL				\$227,543	
MOBILIZATION	15%			\$34,131	
CONSTRUCTION TOTAL				\$261,675	
SALES TAX ON MATERIALS	5.0%			\$3,977	
ENGINEERING AND SUPPORT	20%			\$52,335	
CONST MANAGEMENT	8%			\$20,934	
CAPITAL TOTAL (ROUNDED)				\$340,000	
ANNUAL O&M COST			\$37,000		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$459,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$799,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

Assumptions

Pipe is buried 5-feet deep
Incidentals to consider include:
Excavation through several abandoned utilities and live utilities
Excavating through sections of concrete demolition waste (quantity unknown)
Remove and dispose of an old box culvert (asbestos removal)



Future Pipeline O&M

	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspection	2	Each	0	674	288	\$1,924	2 times/year & 4hrs/time each with 2 laborers with pickup 2 times per year at \$14,000 each lump sum based on 1/2 the USACE estimate of 8/1/00 for the pipeline from mine yard to lined pond of \$28,000
Pigging	2	Each				\$28,000	each
Camera	2	YR	2,000			\$4,000	2 times/year (subcontracted out)
						\$33,924	
Contingency	10%					\$3,392	
Total Annual Cost						\$37,316	

Notes

Camera costs = 1,000/day times 2 days each time (Big Sky Industrial 509/624-4949)

Diversion Costs

Diversions Costs

Bunker Hill

Acid Mine Drainage: Storage

9 Level AMD Diversion Installation (Costs below are for two diversion locations)

Order of Magnitude Cost Opinion

DATE: 08/24/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: J. Winters

N.Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
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Rock work

Construct new 3'x3'x30'lg channel 20 CY 504.49 \$10,090 Assumes no cross cut tunneling to reach a raise for diversion. One diversion will be located at No. 2 Shaft. Second diversion location will be on the Barney Drift, exact location is not known.

Diversion Gates and Flumes

Diversion gates w/electric operator	4	EA	6,407.50	\$25,630	See quote from Plasti-Fab 1/3/00 + markup
Exstg and new channel prep for gates	4	EA	1,513.46	\$6,054	
Gate installation	4	EA	1,112.88	\$4,452	
Price is for trapezoidal flume. Decide during final design which flume type to use. See quote from Plasti-Fab of 1/7/00. PlastiFab says cutthroat flume accuracy not repeatble.					
Cut-throat (trapezoidal) flumes	4	EA	6,000.00	\$24,000	They have discontinued active sales.
Isco flowmeter on each flume	4	EA	4,106.52	\$16,426	See eqmt quote from Whitney Eqmt.
Flume installation	4	EA	1,669.32	\$6,677	Some (<1CY) minor amt of rock work in existing channel.
Extend 480 v power to gates from 9 Level	600	LF	17.83	\$10,700	Assume motor starter w/in 300 ft of gate location.
Extend 120 v power to flowmeters from 9 Level	600	LF	12.13	\$7,277	
TWSP (#16) wire in conduit for flowmeter	10,000	LF	4.62	\$46,169	Two wires: 8000 lf in mine tunnel & 2000 lf buried from gates to CTP
Control wire(#12) for gate operators	10,000	LF	7.56	\$75,644	Eight wires: 8000 lf in mine tunnel & 2000 lf buried from gates to CTP

Diversion pipe in No. 2 Shaft and in the Barney Drift

12 dia HDPE pipe (SDR 17)	840	LF	68.52	\$57,553	Pipe mounted inside a 50 deg mine shaft. Access for installation off mine shaft lift system. Each diversion pipe 420 ft long
Pipe riser clamp brackets (SST)	40	EA	870.54	\$34,822	SST Clamp with base plate and epoxy anchor bolts. Installed at 20 OC along pipe
SST sheet metal inlet box/funnel to riser pipe	2	EA	2,500.00	\$5,000	3'x3' box with one side open and hopper bottom. Outlet pipe on bottom fits up to HPDE pipe.
Installation of inlet box and attachment to pipe	2	EA	1,912.90	\$3,826	Box will require some structural support beams

SUBTOTAL		\$334,319
MISC ALLOWANCE	10%	\$33,432
SUBTOTAL		\$367,751
CONTINGENCY	30%	\$110,325
SUBTOTAL		\$478,077
MOBILIZATION	15%	\$71,712
CONSTRUCTION TOTAL		\$549,788
SALES TAX ON MATERIALS	5.0%	\$6,906
ENGINEERING AND SUPPORT	20%	\$109,958
CONST MANAGEMENT	8%	\$43,983

CAPITAL TOTAL (ROUNDED) \$710,000



Diversion Costs

Diversions Costs

Bunker Hill

DATE: 08/24/2000

Acid Mine Drainage: Storage

PROJECT NO.: 152215.FS.02

9 Level AMD Diversion Installation (Costs below are for two diversion locations)

ESTIMATE BY: J. Winters

Order of Magnitude Cost Opinion

N.Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
ANNUAL O&M COST				\$0	**O & M cost for diversion equipment included with AMD pump O&M.
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$0	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$710,000	

NOTE: The above cost opinion is in February 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

Pumps

Two 700 gpm pumps (constant speed) & Storage from 30 feet below 11 Level and up

Bunker Hill

Acid Mine Drainage: Storage

9 Level AMD Pumping Installation

Order of Magnitude Cost Opinion

DATE: 08/24/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: J. Winters

N.Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Demolition					
Remove exstg pipe in No. 2 Shaft	1	LS	50,000.00	\$50,000	Allowance.
Remove existing centrifugal pump (700 gpm)	1	LS	4,328.72	\$4,329	Allowance. Assume 2 days. No materials.
Pump & Pipe Installation					
Upgrade electrical system into mine at 9 Level	1	ls	100,000.00	\$100,000	Allowance.
New 12-inch dia throttling valve	1	LS	14,749.16	\$14,749	Allowance \$1000/ dia inch. Butterfly valve w/SSTdisk, seat and trim. Gear operator.
New 8' magnetic flowmeter	1	LS	7,632.78	\$7,633	Assume \$750/dia inch for meter. Need 8x12 reducer on each side of meter
Install 400 ft of 12" dia SST pipe (9 Level to 11 Level)	400	lf	156.87	\$62,749	Pipe mtl quote from Alaska copper & Brass (\$57.50/lf plus added \$10/lf for flanged ends) = \$67.50/lf + GC markup
New pipe riser clamps and base 20 ft OC	20	ea	452.24	\$9,045	Pipe inside No. 2 Shaft from 9 to 11 Levels. Single pipe serves both 11 Level pumps.
Motor starters for 11 level Pump A	1	ls	24,576.43	\$24,576	ANM quote from 1/10/00. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
New Pump A (700 & 700 gpm vertical turbine, submersible)	1	LS	38,670.46	\$38,670	SST impeller and trim. Quote due from ANM on 1/10/00. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination. Each pump will be rated for 700 gpm at 460 ft.
Skid/rail car cost for submersible pump A.	1	ls	27,628.80	\$27,629	ANM quote from 1/10/00. Cart will be designed to hold two pumps. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Power cable for two 150 HP Pumps (Pump A type)	500	lf	38.50	\$19,248	Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Wire for pump control back to CTP	11,000	lf	13.42	\$147,583	Wire and conduit. Assume ten # 12 wires plus two TWSP #16
Bubbler level control system mounted at 11 Level	1	ls	3,300.00	\$3,300	Bubbler tube extends to 12 Level. Cost shown is an allowance \$ amount.
New pump & diversion gate control panel at CTP	1	ls	33,000.00	\$33,000	Allowance. \$30k installed. Panel will include pump control, gate control, flowmeter readings from pumps and cutthroat flumes.
Valves					
Check valves	1	ls	8,952.61	\$8,953	12" size. Style not selected yet. Assumed SST valve. Assume \$500/inch dia for valve cost and \$2000 to install it. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Air release valves	1	ls	1,738.83	\$1,739	2" APCO 144 DAT w/SST float. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Isolation valves	1	ls	19,828.68	\$19,829	Assumed \$15000 for 300 psi rated SST BTV. Cost for 1,900 gpm scenario is adjusted for 700 & 700 gpm combination.
Check valve spare	1	ea	6,126.12	\$6,126	

Pumps

Two 700 gpm pumps (constant speed) & Storage from 30 feet below 11 Level and up

Bunker Hill

Acid Mine Drainage: Storage

9 Level AMD Pumping Installation

Order of Magnitude Cost Opinion

DATE: 08/24/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: J. Winters

N.Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
SUBTOTAL				\$579,158	
MISC ALLOWANCE	10%			\$57,916	
SUBTOTAL				\$637,074	
CONTINGENCY	30%			\$191,122	
SUBTOTAL				\$828,196	
MOBILIZATION	15%			\$124,229	
CONSTRUCTION TOTAL				\$952,425	
SALES TAX ON MATERIALS	5.0%			\$18,370	
ENGINEERING AND SUPPORT	20%			\$190,485	
CONST MANAGEMENT	8%			\$76,194	
CAPITAL TOTAL (ROUNDED)				\$1,240,000	
ANNUAL O&M COST			\$126,000		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$1,564,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$2,804,000	

NOTE: The above cost opinion is in February 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

Pump O&M

O&M Costs

Storage from 30 feet below 11 Level and up

Bunker Hill

Acid Mine Drainage: Storage

DATE: 08/24/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: J. Winters

N.Gulensoy

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Mucking out diversion and main channels	1	YR		10,000		\$10,000	Allowance.
Maintenance of electrical system for pumps	1	YR		50,000		\$10,000	Allowance.
Diversion system maintenance	1	YR	2,000	4,800		\$6,800	allowance \$2k materials and 16hrs/mo for 6 months
Pumping System Inspection	365	HR	0	50		\$18,250	asm 1 hr/day, 365 days/yr @ \$50/hr labor
Pump removal and replacement	1	YR	5,000	22,385	672	\$28,057	asm 1 time/year & 120hrs/time + material allowance
Pump maintenance	1	YR	20,000	18,620	3,168	\$41,788	asm 1 time/year & 80hrs/time + material allowance
						\$114,896	
Contingency	10%					\$11,490	
Total Annual Cost						\$126,385	

NOTE:

Pumping cost of extra minewater above 11 Level is not included in this cost estimate due to infrequent pumping and unknown quantities of water.

Pond O&M

O&M Costs
Existing Lined Pond
Bunker Hill
Acid Mine Drainage: Storage

DATE: 01/11/2001
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

O & M COST ESTIMATE DETAILS

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Inspect Pond and Remove Debris	2	YR		4,000		\$8,000	assume 2 times/year - 8 hours @ \$250 to remove & dispose
Pond Repair & Maintenance	1	YR		18,000		\$18,000	fence, gate, road, liner, and misc. maintenance
Pumping System Inspection	8	HR	0	50		\$400	minimal pump operation-assume 2-4hr inspections/ year @ \$50
Pumping System Operation	1	HR	0	50		\$50	allow for power for minimal use
Pump maintenance	1	YR	500.00	800	0	\$1,300	minimal pump operation-assume 2-8hr repairs/ year @ \$50
						\$27,750	
Contingency	10%					\$2,775	
Total Annual Cost						\$30,525	

NOTE:



Bunker Hill
Mine Water
Upgrade HDS Plant & Add Media Filters (2,500gpm) (Equivalent to Phase I
CTP Masterplan)
Order of Magnitude Cost Opinion

DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
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HDS (Hydroxide)

Sitework/Yard Piping

Fencing	500	LF	10.00	\$5,000 allowance	
Gravel Surfacing & Misc	1	LS	25,000.00	\$25,000 allowance	
Connections & Relocations of Existing Piping	1	LS	30,000.00	\$30,000 allowance	

AMD Coarse Filter

Earthwork & Concrete for Slab & Sump	1	LS	6,000.00	\$6,000 10cy @ \$600	
2500gpm Self-Cleaning Filter	2	EA	16,563.04	\$33,126 quote + frt + markup	
Appurtenances for Filter	2	EA	21,738.95	\$43,478 4-valves, fittings, misc	
Electrical for Filter	2	EA	5,000.00	\$10,000 allowance	
Cleaning Debris Bin	2	LS	1,000.00	\$2,000 Fiberglass tank due to pH 2	
Structural Steel Tank Support System	1	LS	5,000.00	\$5,000 allowance	
Supernatant Pump	1	EA	10,000.00	\$10,000 Low pH	
Mechanical for Pump	1	LS	5,000.00	\$5,000 slab, FG tank, concrete sump, pH 2 reqs FG & acid rest conc	
				\$114,604	

Lime Feed System

Earthwork & Concrete for Slab, Curbs, Sumps, etc	1	LS	79,488.00	\$79,488 apx 200cy @ \$400/cy	
Retaining Wall to Accommodate New Tank	550	SF	25.00	\$13,750 55'x 8'H + 2' below grade, CIP cantilever	
Earthwork for Retaining Wall	1	LS	6,814.27	\$6,814	
Paint	1	LS	50,000.00	\$50,000 allowance for subcontract	
Lime Silo, 21'x 48' h, Conical, Coated Steel	1	EA	179,040.98	\$179,041 quote + 5%frt, rep, sp pts + 10%mu, esca;ated	
Screw Feeder, 9" dia x 20' long	2	EA	14,774.78	\$29,550 quote + 5%frt, rep, sp pts + 10%mu, esca;ated	
Lime Slaker, Grit Screen & Screw, Controls	2	EA	74,816.42	\$149,633 quote + 5%frt, rep, sp pts + 10%mu, esca;ated	
Lime Slurry Storage Tank, 43000gal	1	EA	34,015.95	\$34,016	
Lime Slurry Storage Tank Mixer, 15hp	2	EA	17,190.11	\$34,380	
Slurry Circulation Pumps, 100gpm, 50' tdh	4	EA	16,901.45	\$67,606	
Slurry Transfer Pumps, 100gpm, 50' tdh	4	EA	16,901.45	\$67,606 same as above	
Grit Bin	2	EA	2,183.17	\$4,366 allowance	
Clean, Refurbish, Upgrade Existing System	1	LS	24,653.63	\$24,654 allow hours & misc parts i.e. bin vents,etc	
Truck Unloading Improvements	1	LS	10,000.00	\$10,000 ACP, curbing, etc - allowance	
Lime Slurry Piping, 2" GE Steel	1,000	LF	20.20	\$20,205 incl cplgs, ftgs, etc, on pipe rack	
Piping Rack	250	LF	25.00	\$6,250 allowance	

Reactor A (Sludge Conditioning Tank)

Earthwork & Concrete for Slab	1	LS	19,872.00	\$19,872 apx 50cy @ \$400/cy	
Elevated Platform for Reactor A&B	1	LS	60,000.00	\$60,000 asm 40x20 @ \$75/sf high level and to support reactor A	
Paint	1	LS	10,000.00	\$10,000 allowance for subcontract	
Sludge Conditioning Tank, 2500gal FRP	1	EA	42,694.85	\$42,695 quote + 5% infla. + 5%frt + 10%mu	

Bunker Hill
Mine Water
Upgrade HDS Plant & Add Media Filters (2,500gpm) (Equivalent to Phase I
CTP Masterplan)
Order of Magnitude Cost Opinion

DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Mixer, 3hp	1	EA	13,802.75	\$13,803	quote + 5% infla. + 5%frt + 10%mu
Inlet Piping, 24" SDR 15.5	120	LF	193.68	\$23,242	constrained schedule & access w/obstacles, ftgs, valves, connections, etc
Inlet Piping, 18" SDR 15.5	120	LF	146.95	\$17,634	constrained schedule & access w/obstacles, ftgs, valves, connections, etc
Valves, vaults, etc	1	LS	50,000.00	\$50,000	allowance
Neutralization/Oxidation System					
Distribution Piping, 24" HDPE	170	LF	193.68	\$32,926	constrained schedule & access w/obstacles, ftgs, valves, connections, etc
Retaining Wall to Accommodate New Tank	450	SF	25.00	\$11,250	45'x 8'H + 2' below grade, CIP cantilever
Earthwork for Retaining Wall	1	LS	6,814.27	\$6,814	
Earthwork & Concrete for Slab	1	LS	65,577.60	\$65,578	apx 165cy @ \$400/cy
Paint	1	LS	50,000.00	\$50,000	allowance for subcontract
Aeration Tank (Reactor B), 75,000gal Steel Tank	1	EA	37,500.00	\$37,500	revised to \$.50/gal
Submerged Turbine Aerator/Mixer	1	EA	73,520.37	\$73,520	use same a 5000gpm estimate
Positive Displacement Blower	1	EA	13,205.04	\$13,205	
Pipe Supports, Hangers, etc	1	LS	2,500.00	\$2,500	allowance
Automated Polymer Make-up & Feed System					
Earthwork & Concrete for Slab	1	LS	0.00	\$0	in bldg
Paint	1	LS	5,000.00	\$5,000	allowance for subcontract
Polymer Make-up System	2	EA	10,216.52	\$20,433	
Polymer Make-up Tank, 2000gal	1	EA	3,973.95	\$3,974	
Mixer	2	EA	2,337.07	\$4,674	corrected hours
Transfer Pump, 20gpm	2	EA	3,273.75	\$6,548	corrected hours
Polymer Feed Tank, 2000gal	1	EA	3,973.95	\$3,974	
Variable Speed Gear Pump, 1gpm	2	EA	4,210.43	\$8,421	
Piping to Feed Point	100	LF	19.90	\$1,990	
Thickener					
Clean & Decommission Existing Floc System	1	LS	1,774.62	\$1,775	
Replace Weir	1	LS	28,860.00	\$28,860	quote + frt & markup=\$19/lf & allow for removal & replacement
Groundwater Test & Empty Tank	1	LS	10,000.00	\$10,000	allowance
Replace Thickener Rake System Complete	1	LS	146,934.08	\$146,934	quote + frt & markup
E-DUC Feed & Floc System & Center Well Mods	1	LS	45,933.63	\$45,934	quote + frt & markup + add'l parts for mods
Surface Prep & Coat	1	LS	100,000.00	\$100,000	allowance for interior walls & mechanism
Sludge Wasting & Recycle Pumps					
Earthwork & Concrete for Slab	1	LS	79,488.00	\$79,488	apx 200cy @ \$400/cy
Remove Existing Pumps	1	LS	2,474.40	\$2,474	
Paint	1	LS	20,000.00	\$20,000	allowance for subcontract



Bunker Hill
Mine Water
Upgrade HDS Plant & Add Media Filters (2,500gpm) (Equivalent to Phase I
CTP Masterplan)
Order of Magnitude Cost Opinion

DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Sludge Recycle Pump, 400gpm	2	EA	14,616.89	\$29,234	new cost for smaller pump
Sludge Recycle Pump, 800gpm	2	EA	22,047.87	\$44,096	new cost for smaller pump
Sludge Waste Pump, 400gpm, 200' tdh	2	EA	26,380.15	\$52,760	new cost for larger pump
Sludge Recycle Piping, 8" DI	600	LF	68.47	\$41,084	including ftgs, valves, etc, revised cost
Sludge Wasting Piping, 6" DI	400	LF	54.78	\$21,912	including ftgs, valves, etc, revised cost
I&C and Electrical					
Total I&C	1	LS	108,103.26	\$108,103	use 5% of above
Generator & Fuel Tank	1	EA	352,246.48	\$352,246	same as 5000gpm + escalation
New Magnetic Flowmeter in Existing Vault	1	EA	10,268.68	\$10,269	24"
Parshall Flume @ Effluent	1	EA	3,037.37	\$3,037	12"
Electrical	1	LS	210,857.68	\$210,858	use 8% of above
Building Extension					
Addition to Existing Building	900	SF	150.00	\$135,000	added size for additional pumps
Existing Plant Demolition					
Earthwork	1	LS	7,314.27	\$7,314	
Concrete Slab & Footings	100	CY	255.36	\$25,536	assume 18" avg thickness to account for ftgs, etc
Relocate Existing Filtration Bldg, etc	1	LS	34,071.36	\$34,071	60' x 30' x 10' eave ht metal bldg-remove contents, dismantle & re-erect
Repairs, Touchup, etc	1	LS	5,000.00	\$5,000	allowance for some painting, sealants, doors, etc
Water	1	LS	4,234.70	\$4,235	sink, emer. Shower, hose bibbs, piping & service
Sanitary	1	LS	1,917.35	\$1,917	toilet, piping & service
Drains	1	LS	2,117.35	\$2,117	
HVAC	1	LS	1,617.35	\$1,617	reinstall unit heaters
Electrical	1	LS	4,933.48	\$4,933	reinstall, fixtures, panels, wiring, etc
<u>Tertiary Media Filters</u>					
HDS Pump Station Complete	1	LS	70,000.00	\$70,000	cost by DAH
Water Reuse Pump Station Complete	1	LS	30,000.00	\$30,000	cost by DAH
Distribution Piping	500	LF	35.00	\$17,500	4" plastic, below grade
Media Filter System	1	LS	566,834.08	\$566,834	quote=430000 + 10% frt + 10% mu & 100hrs to install
Liquid Polymer System	0	LS	47,634.41	\$0	Not required per JS 11/28/2000
Backwash Pumping Complete	1	LS	133,461.22	\$133,461	Bob York spreadsheet + 10% OH&P, scaled to 2500gpm + escalation to 2000gpm
Dirty Backwash Storage Tank, 30,000gal	1	EA	22,500.00	\$22,500	\$.75/gal
Dirty Backwash Storage Tank Mixer	1	EA	3,737.46	\$3,737	allowance
Dirty Backwash Return Pump	1	EA	13,885.36	\$13,885	allowance
Clean Backwash Supply Tank, 30,000gal	1	EA	22,500.00	\$22,500	\$.75/gal
Clean Backwash Supply Pump	1	EA	13,885.36	\$13,885	



**Bunker Hill
Mine Water
Upgrade HDS Plant & Add Media Filters (2,500gpm) (Equivalent to Phase I
CTP Masterplan)
Order of Magnitude Cost Opinion**

**DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST	COMMENTS
Building Complete	1	LS	318,750.00	\$318,750	85'x 50 @ \$75/sf
Electrical/I&C	1	LS	0.00	\$0	included
Mechanical	1	LS	0.00	\$0	included
Backflow Preventer	1	EA	10,000.00	\$10,000	allowance
Distribution Piping	1,000	LF	23.00	\$23,000	2" plastic
Paint	1	LS	5,000.00	\$5,000	misc painting allowance
SUBTOTAL				\$4,319,374	
MISC ALLOWANCE	5%			\$215,969	
SUBTOTAL				\$4,535,343	
CONTINGENCY	20%			\$907,069	
SUBTOTAL				\$5,442,411	
MOBILIZATION	15%			\$816,362	
CONSTRUCTION TOTAL				\$6,258,773	
SALES TAX ON MATERIALS	5.0%			\$186,656	
ENGINEERING AND SUPPORT	20%			\$1,251,755	
CONSTRUCTION MANAGEMENT	8%			\$500,702	
CAPITAL TOTAL (ROUNDED)				\$8,198,000	
ANNUAL O&M COST			\$763,000		
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)				\$9,468,000	
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST				\$17,666,000	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in October 2000 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Total Cost	Comments
Annual Costs							
Operation Costs	1	YR	0	509,000	0	\$509,000	Based on existing plant O&M costs calculated over 12/98 to 9/00; excludes outside analytical services & non routine maintenance asm 2% of subtotal after allowance of HDS upgrade
Maintenance Costs @ 2%	1	YR	0	90,707	0	\$90,707	
HDS Effluent Pump Station	1	YR	46,800	0	0	\$46,800	
Media Filters	1	YR	97,500	0	0	\$97,500	
Backwash Pumping	1	YR	8,775	0	0	\$8,775	
Building (not incl HDS)	1	YR	0	2,400	0	\$2,400	
						\$755,182	
Contingency	10%					\$75,518	
Subtotal						\$831,000	
Lime Savings Estimated at 20% Reduction in Lime Use						(\$68,000)	Annual lime cost without mitigations estimated at \$335,000/year
Total Annual Cost With Savings						\$763,000	
NPV of Annual O&M Costs (30 years @ 7%)						\$9,468,000	

Alternative 5

Cost Summary

**Alternative 5
Option A**

Bunker Hill

Acid Mine Drainage

Disposal of Raw Sludge in CIA Disposal Beds

Order of Magnitude Cost Opinion (Quantity reduced by 20%)

DATE: 11/22/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Bunte

N. Gulensoy

DESCRIPTION	QTY	QTY Reduced by 20%	UNIT	TOTAL UNIT COST	TOTAL COST
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Sitework/Yard Piping

6" HDPE Sludge Pipeline in Trench	800		LF	21.54	\$17,233
6" HDPE Leachate Pipeline in Trench	800		LF	21.54	\$17,233

Sludge Pumping

Prefab Metal Bldg w/Concrete Floor	216		SF	150.00	\$32,400
Paint	1		LS	5,000.00	\$5,000
Pump, 30hp	2		EA	14,810.06	\$29,620
Standby Pump, 30hp	1		EA	14,810.06	\$14,810
Gland Seal Water Pump	1		EA	7,948.38	\$7,948
Electrical/I&C	1		LS	17,955.71	\$17,956

Sludge Disposal Bed (per each)

Excavation	25,000	20,000	C. Y.	3.00	\$60,000
Subgrade Preparation	5	4	Acres	3,000.00	\$12,000
Subgrade Stabilization	10,500	8,400	C. Y.	4.00	\$33,600
Liner Protection Sand	8250	6,600	C. Y.	10.00	\$66,000
Drain Rock	1,950	1,560	C. Y.	18.00	\$28,080
Ditch Lining Geotextile	21,200	16,960	S. Y.	1.65	\$27,984
G C L	18,100	14,480	S. Y.	4.05	\$58,644
H D P E Geomembrane	18,100	14,480	S. Y.	5.40	\$78,192
H D P E Pipe, 10"	550	440	L. F.	23.00	\$10,120
Erosion Control Matting	11800	9,440	S.Y.	1.50	\$14,160
Perf Pipe, 4"	2000	1,600	L. F.	2.00	\$3,200
Perf Pipe, 6"	580	464	L. F.	3.00	\$1,392
HDPE Pipe, 6"	130	104	L. F.	2.50	\$260
Strip Drains	700	560	L. F.	1.75	\$980
Valves, 6" Knife Gate	2		Each	700	\$1,400
Valves, 10" Knife Gate	6		Each	1,000	\$6,000
Air/Vacuum Release Valve	1		Each	2,000	\$2,000
Valve Vault	6		Each	1,950	\$11,700
Water Tight Manhole	1		Each	3,500	\$3,500
Vertical Filtrate Drains	6		Each	4,000	\$24,000
Cleanouts	2		Each	750	\$1,500
Perimeter Road Embankment (not reduced)	43500	43,500	C. Y.	10	\$435,000
Chain Link Fence and Gates (not reduced)	2000	2,000	L.F.	12	\$24,000
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	15	\$22,500

SUBTOTAL					\$1,068,412
MISC ALLOWANCE	10%				\$106,841
SUBTOTAL					\$1,175,253
CONTINGENCY	30%				\$352,576
SUBTOTAL					\$1,527,829
MOBILIZATION	15%				\$229,174
CONSTRUCTION TOTAL					\$1,757,003
SALES TAX ON MATERIALS	5.0%				\$28,216
ENGINEERING AND SUPPORT	20%				\$351,401
CONSTRUCTION MANAGEMENT	8%				\$140,560

CAPITAL COST FIRST BED (ROUNDED) \$2,280,000

**CAPITAL COST FOR NEW CELLS IN FUTURE YEARS
(DOES NOT INCLUDE PUMPING AND PIPING COST)**

Sludge Disposal Bed (per each)

Excavation	25,000	20,000	C. Y.	3.00	\$60,000
Subgrade Preparation	5	4	Acres	3,000.00	\$12,000



**Alternative 5
Option A**

Bunker Hill

Acid Mine Drainage

Disposal of Raw Sludge in CIA Disposal Beds

Order of Magnitude Cost Opinion (Quantity reduced by 20%)

DATE: 11/22/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Bunte

N. Gulensoy

DESCRIPTION	QTY	QTY Reduced by 20%	UNIT	TOTAL UNIT COST	TOTAL COST
Subgrade Stabilization	10,500	8,400	C. Y.	4.00	\$33,600
Liner Protection Sand	8250	6,600	C. Y.	10.00	\$66,000
Drain Rock	1,950	1,560	C. Y.	18.00	\$28,080
Ditch Lining Geotextile	21,200	16,960	S. Y.	1.65	\$27,984
G C L	18,100	14,480	S. Y.	4.05	\$58,644
H D P E Geomembrane	18,100	14,480	S. Y.	5.40	\$78,192
H D P E Pipe, 10"	550	440	L. F.	23.00	\$10,120
Erosion Control Matting	11800	9,440	S.Y.	1.50	\$14,160
Perf Pipe, 4"	2000	1,600	L. F.	2.00	\$3,200
Perf Pipe, 6"	580	464	L. F.	3.00	\$1,392
HDPE Pipe, 6"	130	104	L. F.	2.50	\$260
Strip Drains	700	560	L. F.	1.75	\$980
Valves, 6" Knife Gate	2		Each	700.00	\$1,400
Valves, 10" Knife Gate	6		Each	1,000.00	\$6,000
Air/Vacuum Release Valve	1		Each	2,000.00	\$2,000
Valve Vault	6		Each	1,950.00	\$11,700
Water Tight Manhole	1		Each	3,500.00	\$3,500
Vertical Filtrate Drains	6		Each	4,000.00	\$24,000
Cleanouts	2		Each	750.00	\$1,500
Perimeter Road Embankment (not reduced)	28275	28,275	C. Y.	10	\$282,750
Chain Link Fence and Gates (not reduced)	1000	1,000	L.F.	12	\$12,000
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	15	\$22,500

SUBTOTAL		\$926,212
MISC ALLOWANCE	10%	\$92,621
SUBTOTAL		\$1,018,833
CONTINGENCY	30%	\$305,650
SUBTOTAL		\$1,324,483
MOBILIZATION	15%	\$198,672
CONSTRUCTION TOTAL		\$1,523,156
SALES TAX ON MATERIALS	5.0%	\$25,622
ENGINEERING AND SUPPORT	20%	\$304,631
CONSTRUCTION MANAGEMENT	8%	\$121,852

CAPITAL COST SUBSEQUENT BEDS TOTAL (ROUNDED) \$1,980,000

ANNUAL O&M COST FOR OPERATING BED \$38,000

NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST) \$471,000

NPV OF INITIAL AND SUBSEQUENT BEDS & CLOSURES CAPITAL COSTS @ 7% INTEREST \$6,321,000

TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST \$6,792,000

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 5
Option A**

Bunker Hill

Acid Mine Drainage

Sludge CIA Disposal Beds - Future Closure Cost

Order of Magnitude Cost Opinion (Quantity reduced by 20%)

DATE: 11/22/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Bunte

N. Gulensoy

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Sludge Disposal Bed Closure (per each)

Cell Closure Allowance	3.04	AC	137,500.00	\$418,000
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SUBTOTAL				\$418,000
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MISC ALLOWANCE	10%			\$41,800
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SUBTOTAL				\$459,800
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CONTINGENCY	30%			\$137,940
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SUBTOTAL				\$597,740
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MOBILIZATION	15%			\$89,661
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CONSTRUCTION TOTAL				\$687,401
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SALES TAX ON MATERIALS	5.0%			\$9,500
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ENGINEERING AND SUPPORT	20%			\$137,480
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CONSTRUCTION MANAGEMENT	8%			\$54,992
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CAPITAL TOTAL (ROUNDED)				\$890,000
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ANNUAL O&M COST (considered incidental to rest of CIA)			\$0	
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NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.

Contingency is for scope changes that are presently unforeseen.

Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation.

The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 5
Option A**

**Bunker Hill
Acid Mine Drainage
Closure of Existing Sludge Pond on CIA
Order of Magnitude Cost Opinion**

**DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Closure of Existing Sludge Pond on CIA

Cell Closure Allowance	6.50	AC	137,500.00	\$893,750
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SUBTOTAL				\$893,750
MISC ALLOWANCE	10%			\$89,375
SUBTOTAL				\$983,125
CONTINGENCY	30%			\$294,938
SUBTOTAL				\$1,278,063
MOBILIZATION	15%			\$191,709
CONSTRUCTION TOTAL				\$1,469,772
SALES TAX ON MATERIALS	5.0%			\$20,313
ENGINEERING AND SUPPORT	20%			\$293,954
CONSTRUCTION MANAGEMENT	8%			\$117,582

CAPITAL TOTAL (ROUNDED)				\$1,900,000
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ANNUAL O&M COST (considered incidental to rest of CIA)			\$0	
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NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 5
Option A
O & M COST ESTIMATE DETAILS**

Description	Qty	Unit	Unit Cost	Total Cost
Annual Costs				
Pump Station & Pipeline				
Operation Labor	1	YR	20,000	\$20,000
Pump & Pipeline Maintenance & Repairs	1	YR	7,586	\$7,586
Power Cost for Pumping & Misc (Quantity reduced by 20%)	8,000	kWHR	0	\$400
Filtrate Discharge System Inspect/Clean	4	EA	1,000	\$4,000
Roads Maintenance	1	EA	2,500	\$2,500
			Subtotal	\$34,486
Contingency	10%			\$3,449
Total Annual Cost				\$37,934



Alternative 5**Sludge Management Option A****ANNUAL O&M COSTS CALCULATIONS****Series of Expenditures**

Interest Rate	7.00%
Net Present Value	\$470,727

Year	Annual Cost	Factor	NPV
0	NA	1.0000	NA
1	\$37,934	0.9346	\$35,452
2	\$37,934	0.8734	\$33,133
3	\$37,934	0.8163	\$30,966
4	\$37,934	0.7629	\$28,940
5	\$37,934	0.7130	\$27,047
6	\$37,934	0.6663	\$25,277
7	\$37,934	0.6227	\$23,623
8	\$37,934	0.5820	\$22,078
9	\$37,934	0.5439	\$20,634
10	\$37,934	0.5083	\$19,284
11	\$37,934	0.4751	\$18,022
12	\$37,934	0.4440	\$16,843
13	\$37,934	0.4150	\$15,741
14	\$37,934	0.3878	\$14,712
15	\$37,934	0.3624	\$13,749
16	\$37,934	0.3387	\$12,850
17	\$37,934	0.3166	\$12,009
18	\$37,934	0.2959	\$11,223
19	\$37,934	0.2765	\$10,489
20	\$37,934	0.2584	\$9,803
21	\$37,934	0.2415	\$9,162
22	\$37,934	0.2257	\$8,562
23	\$37,934	0.2109	\$8,002
24	\$37,934	0.1971	\$7,479
25	\$37,934	0.1842	\$6,989
26	\$37,934	0.1722	\$6,532
27	\$37,934	0.1609	\$6,105
28	\$37,934	0.1504	\$5,705
29	\$37,934	0.1406	\$5,332
30	\$37,934	0.1314	\$4,983

PERIODIC COSTS CALCULATIONS**Single Expenditure at Year XX**

Interest Rate	7.00%
Net Present Value	\$6,204,782

Year	Investment	Factor	NPV	
0	\$2,280,000	1.0000	\$2,280,000	initial bed construction
1	\$0	0.9346	\$0	
2	\$1,900,000	0.8734	\$1,659,534	closure of existing bed
3	\$0	0.8163	\$0	
4	\$0	0.7629	\$0	
5	\$0	0.7130	\$0	
6	\$0	0.6663	\$0	
7	\$0	0.6227	\$0	
8	\$0	0.5820	\$0	
9	\$0	0.5439	\$0	
10	\$1,980,000	0.5083	\$1,006,532	new bed
11	\$890,000	0.4751	\$422,833	closure
12	\$0	0.4440	\$0	
13	\$0	0.4150	\$0	
14	\$0	0.3878	\$0	
15	\$0	0.3624	\$0	
16	\$0	0.3387	\$0	
17	\$0	0.3166	\$0	
18	\$0	0.2959	\$0	
19	\$0	0.2765	\$0	
20	\$1,980,000	0.2584	\$511,670	new bed
21	\$890,000	0.2415	\$214,947	closure
22	\$0	0.2257	\$0	
23	\$0	0.2109	\$0	
24	\$0	0.1971	\$0	
25	\$0	0.1842	\$0	
26	\$0	0.1722	\$0	
27	\$0	0.1609	\$0	
28	\$0	0.1504	\$0	
29	\$0	0.1406	\$0	
30	\$0	0.1314	\$0	
31	\$890,000	0.1228	\$109,268	closure

**Alternative 5
Option B**

**Bunker Hill
Acid Mine Drainage
Dewatering with Belt Filter Press
Order of Magnitude Cost Opinion (Quantity reduced by 20%)**

**DATE: 08/24/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Belt Filter Press				
Earthwork & Concrete for Slab	0	LS	\$0	\$0
Misc Metals	1	LS	\$0	\$0
Building	3,499	SF	\$130	\$454,839
Paint	1	LS	\$17,494	\$17,494
Belt Press	4	EA	\$227,892	\$911,567
Booster Pump	1	EA	\$5,942	\$5,942
Air Compressor	1	EA	\$4,932	\$4,932
Conveyor	4	EA	\$33,160	\$132,638
Storage Hopper	2	EA	\$34,110	\$68,220
Electrical/I&C	1	LS	\$0	\$0
Haul to Off-Site Landfill				
Load	0	CY	\$0	\$0
Misc	0	LS	\$0	\$0

SUBTOTAL		\$1,595,632
MISC ALLOWANCE	10%	\$159,563
SUBTOTAL		\$1,755,195
CONTINGENCY	30%	\$526,559
SUBTOTAL		\$2,281,754
MOBILIZATION	15%	\$342,263
CONSTRUCTION TOTAL		\$2,624,017
SALES TAX ON MATERIALS	5.0%	\$84,041
ENGINEERING AND SUPPORT	20%	\$524,803
CONSTRUCTION MANAGEMENT	8%	\$209,921

FILTER PRESS CAPITAL TOTAL (ROUNDED)	\$3,440,000
FILTER PRESS ANNUAL O&M COST	\$143,000
30-YEAR NPV OF FILTER PRESS ANNUAL O&M COST	\$1,774,000
HAUL AND DISPOSE OFFSITE ANNUAL O&M COST	\$475,000
30-YEAR NPV OF HAUL AND DISPOSE OFFSITE	\$5,894,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST	\$11,108,000

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in August 2000 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

**Alternative 5
Option B**

O & M COST ESTIMATE DETAILS (Quantity reduced by 20%)

Description	Qty	Unit	Unit Cost	Total Cost
<u>Annual Costs</u>				
Belt Press Operator/Mechanic (fixed)	1	YR	100,000	\$100,000
Belt Press Repair Parts (reduced by 20%)	1	YR	13,760	\$13,760
Chemical Conditioning Polymer (reduced by 20%)	1	YR	16,000	\$16,000
Operation Costs (reduced by 20%)	12,800	kWHR	0	\$640
			Subtotal	\$130,400
Contingency	10%			\$13,040
Total Annual Cost				\$143,440



**Alternative 5
Option B**

O & M COST ESTIMATE DETAILS (Quantity reduced by 20%)

Description	Qty	Unit	Unit Cost	Total Cost	Comments
<u>Annual Costs</u>					
Haul & Dispose	9,920	TN	43.5	\$431,520	Based on Alt 2, reduced by 20%
				\$431,520	
Contingency	10%			\$43,152	
Total Annual Cost				\$475,000	



**Alternative 5
Option C**

Bunker Hill

Acid Mine Drainage

Disposal of Raw Sludge in Smelter Closure Area Disposal Beds

Order of Magnitude Cost Opinion (Quantity reduced by 20%)

DATE: 11/29/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Bunte

N. Gulensoy

DESCRIPTION	QTY	QTY Reduced by 20%	UNIT	TOTAL UNIT COST	TOTAL COST
Sitework/Yard Piping					
Clear & Grub	20		AC	3,000.00	\$60,000
Site Prep Cut	300,000	240,000	CY	3.30	\$990,000
Site Prep Fill	300,000	240,000	CY	1.10	\$330,000
6" HDPE Sludge Pipeline in Trench	6,400		LF	31.78	\$203,421
6" HDPE Leachate Pipeline in Trench	2,500		LF	24.70	\$61,749
Leachate pipe tie in to pump	1		LS	2,000.00	\$2,000
Manholes	7		EA	3,850.00	\$26,950
Sludge Pumping					
Prefab Metal Bldg w/Concrete Floor	500		SF	165.00	\$82,500
Paint	1		LS	5,500.00	\$5,500
Pump, 30hp	4		EA	15,380.27	\$61,521
Standby Pump, 30hp	1		EA	15,380.27	\$15,380
Gland Seal Water Pump	1		EA	8,136.01	\$8,136
Electrical/I&C	1		LS	32,400.00	\$32,400
6" Check Valve	4		EA	1,897.78	\$7,591
6" Gate Valve	4		EA	1,897.78	\$7,591
6" HDPE Pipe in Trench	200		LF	22.50	\$4,500
Flushing Hookups	1		LS	5,500.00	\$5,500
Pipeline Cleanout Pig Station	1		LS	27,500.00	\$27,500
Sludge Disposal Bed (per each)					
Excavation	25,000	20,000	C. Y.	3.30	\$66,000
Subgrade Preparation	5	4 Acres		3,300.00	\$13,200
Subgrade Stabilization	10,500	8,400	C. Y.	4.40	\$36,960
Liner Protection Sand	8250	6,600	C. Y.	19.80	\$130,680
Drain Rock	1,950	1,560	C. Y.	19.80	\$30,888
Ditch Lining Geotextile	21,200	16,960	S. Y.	1.82	\$30,782
G C L	18,100	14,480	S. Y.	4.46	\$64,508
H D P E Geomembrane	18,100	14,480	S. Y.	5.94	\$86,011
H D P E Pipe, 10"	550	440	L. F.	25.30	\$11,132
Erosion Control Matting	11800	9,440	S.Y.	1.65	\$15,576
Perf Pipe, 4"	2000	1,600	L. F.	2.20	\$3,520
Perf Pipe, 6"	580	464	L. F.	3.30	\$1,531
HDPE Pipe, 6"	130	104	L. F.	2.75	\$286
Strip Drains	700	560	L. F.	1.93	\$1,078
Valves, 6" Knife Gate	2		Each	770.00	\$1,540
Valves, 10" Knife Gate	6		Each	1,100.00	\$6,600
Air/Vacuum Release Valve	1		Each	2,200.00	\$2,200
Valve Vault	6		Each	2,145.00	\$12,870
Water Tight Manhole	1		Each	3,850.00	\$3,850
Vertical Filtrate Drains	6		Each	4,400.00	\$26,400
Cleanouts	2		Each	825.00	\$1,650
Perimeter Road Embankment (not reduced)	43500	43,500	C. Y.	11.00	\$478,500
Chain Link Fence and Gates (not reduced)	2000	2,000	L.F.	13.20	\$26,400
Groundwater Monitoring Wells	2		Each	6,600.00	\$13,200
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	16.50	\$24,750
SUBTOTAL					\$3,022,353
MISC ALLOWANCE	10%				\$302,235
SUBTOTAL					\$3,324,588
CONTINGENCY	30%				\$997,377
SUBTOTAL					\$4,321,965
MOBILIZATION	15%				\$648,295
CONSTRUCTION TOTAL					\$4,970,260
SALES TAX ON MATERIALS	5.0%				\$60,650
ENGINEERING AND SUPPORT	20%				\$994,052
CONSTRUCTION MANAGEMENT	8%				\$397,621
CAPITAL COST FIRST BED (ROUNDED)					\$6,420,000



**Alternative 5
Option C**

Bunker Hill

Acid Mine Drainage

Disposal of Raw Sludge in Smelter Closure Area Disposal Beds

Order of Magnitude Cost Opinion (Quantity reduced by 20%)

DATE: 11/29/2000

PROJECT NO.: 152215.FS.02

ESTIMATE BY: D. Bunte

N. Gulensoy

DESCRIPTION	QTY	QTY Reduced by 20%	UNIT	TOTAL UNIT COST	TOTAL COST
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**CAPITAL COST FOR NEW CELLS IN FUTURE YEARS
(DOES NOT INCLUDE PUMPING AND PIPING COST)**

Sludge Disposal Bed (per each)

Excavation	25,000	20,000	C. Y.	3.30	\$66,000
Subgrade Preparation	5	4	Acres	3,300.00	\$13,200
Subgrade Stabilization	10,500	8,400	C. Y.	4.40	\$36,960
Liner Protection Sand	8250	6,600	C. Y.	19.80	\$130,880
Drain Rock	1,950	1,560	C. Y.	19.80	\$30,888
Ditch Lining Geotextile	21,200	16,960	S. Y.	1.82	\$30,782
G C L	18,100	14,480	S. Y.	4.46	\$64,508
H D P E Geomembrane	18,100	14,480	S. Y.	5.94	\$86,011
H D P E Pipe, 10"	550	440	L. F.	25.30	\$11,132
Erosion Control Matting	11800	9,440	S.Y.	1.65	\$15,576
Perf Pipe, 4"	2000	1,600	L. F.	2.20	\$3,520
Perf Pipe, 6"	580	464	L. F.	3.30	\$1,531
HDPE Pipe, 6"	130	104	L. F.	2.75	\$286
Strip Drains	700	560	L. F.	1.93	\$1,078
Valves, 6" Knife Gate	2		Each	770.00	\$0
Valves, 10" Knife Gate	6		Each	1,100.00	\$0
Air/Vacuum Release Valve	1		Each	2,200.00	\$0
Valve Vault	6		Each	2,145.00	\$0
Water Tight Manhole	1		Each	3,850.00	\$0
Vertical Filtrate Drains	6		Each	4,400.00	\$0
Cleanouts	2		Each	825.00	\$0
Perimeter Road Embankment (not reduced)	28275	28,275	C. Y.	11.00	\$311,025
Chain Link Fence and Gates (not reduced)	1000	1,000	L.F.	13.20	\$13,200
Groundwater Monitoring Wells	2		Each	6,600.00	\$13,200
Crushed Rock Surfacing (not reduced)	1500	1,500	C. Y.	16.50	\$24,750

SUBTOTAL		\$1,090,113
MISC ALLOWANCE	10%	\$109,011
SUBTOTAL		\$1,199,125
CONTINGENCY	30%	\$359,737
SUBTOTAL		\$1,558,862
MOBILIZATION	15%	\$233,829
CONSTRUCTION TOTAL		\$1,792,691
SALES TAX ON MATERIALS	5.0%	\$27,572
ENGINEERING AND SUPPORT	20%	\$358,538
CONSTRUCTION MANAGEMENT	8%	\$143,415

CAPITAL COST SUBSEQUENT BEDS TOTAL (ROUNDED) \$2,320,000

ANNUAL O&M COST FOR OPERATING BED \$62,000

NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST) \$765,000

NPV OF INITIAL AND SUBSEQUENT BEDS & CLOSURES CAPITAL COSTS @ 7% INTEREST \$10,722,000

TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST \$11,487,000

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.

Contingency is for scope changes that are presently unforeseen.

Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation.

The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

**Alternative 5
Option C**

**Bunker Hill
Acid Mine Drainage
Smelter Closure Area Sludge Disposal Beds - Future Closure Cost
Order of Magnitude Cost Opinion (Quantity reduced by 20%)**

**DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
Sludge Disposal Bed Closure (per each)				
Cell Closure Allowance	3.04	AC	137,500.00	\$418,000
SUBTOTAL				\$418,000
MISC ALLOWANCE	10%			\$41,800
SUBTOTAL				\$459,800
CONTINGENCY	30%			\$137,940
SUBTOTAL				\$597,740
MOBILIZATION	15%			\$89,661
CONSTRUCTION TOTAL				\$687,401
SALES TAX ON MATERIALS	5.0%			\$9,500
ENGINEERING AND SUPPORT	20%			\$137,480
CONSTRUCTION MANAGEMENT	8%			\$54,992
CAPITAL TOTAL (ROUNDED)				\$890,000
ANNUAL O&M COST (considered incidental to operating sludge bed)				\$0

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 2
Option C**

**Bunker Hill
Acid Mine Drainage
Closure of Existing CIA Sludge Pond
Order of Magnitude Cost Opinion**

**DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Closure of Existing CIA Sludge Pond

Cell Closure Allowance	6.50	AC	137,500.00	\$893,750
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SUBTOTAL				\$893,750
MISC ALLOWANCE	10%			\$89,375
SUBTOTAL				\$983,125
CONTINGENCY	30%			\$294,938
SUBTOTAL				\$1,278,063
MOBILIZATION	15%			\$191,709
CONSTRUCTION TOTAL				\$1,469,772
SALES TAX ON MATERIALS	5.0%			\$20,313
ENGINEERING AND SUPPORT	20%			\$293,954
CONSTRUCTION MANAGEMENT	8%			\$117,582

CAPITAL TOTAL (ROUNDED)				\$1,900,000
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ANNUAL O&M COST (considered incidental to rest of CIA)			\$0	
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NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



**Alternative 5
Option C**

O & M COST ESTIMATE DETAILS

Description	Qty	Unit	UNIT COST	Total Cost
Annual Costs				
Pump Station & Pipeline				
Operation Labor	1	YR	\$26,400	\$26,400
Pump & Pipeline Maintenance & Repairs	1	YR	\$8,344	\$8,344
Power Cost for Pumping & Misc (Quantity reduced by 20%)	52,000	kWHR	\$0.06	\$2,860
Groundwater/Surface Water Monitoring				
System Inspection & Sampling	48	HR	\$88	\$4,224
Sample Shipping	4	EA	\$66	\$264
Supplies	4	EA	\$220	\$880
Indicator Analyses (quarterly)	8	EA	\$297	\$2,376
Metals Analyses (semiannually)	6	EA	\$220	\$1,320
Reporting	20	HR	\$110	\$2,200
Filtrate Discharge System Inspect/Clean	4	EA	\$1,100	\$4,400
Roads Maintenance	1	EA	\$2,750	\$2,750
			Subtotal	\$56,018
				\$5,602
Contingency	10%			
Total Annual Cost				\$61,620

Alternative 5

Sludge Management Option A

ANNUAL O&M COSTS CALCULATIONS

Series of Expenditures

Interest Rate	7.00%
Net Present Value	\$470,727

Year	Annual Cost	Factor	NPV
0	NA	1.0000	NA
1	\$37,934	0.9346	\$35,452
2	\$37,934	0.8734	\$33,133
3	\$37,934	0.8163	\$30,966
4	\$37,934	0.7629	\$28,940
5	\$37,934	0.7130	\$27,047
6	\$37,934	0.6663	\$25,277
7	\$37,934	0.6227	\$23,623
8	\$37,934	0.5820	\$22,078
9	\$37,934	0.5439	\$20,634
10	\$37,934	0.5083	\$19,284
11	\$37,934	0.4751	\$18,022
12	\$37,934	0.4440	\$16,843
13	\$37,934	0.4150	\$15,741
14	\$37,934	0.3878	\$14,712
15	\$37,934	0.3624	\$13,749
16	\$37,934	0.3387	\$12,850
17	\$37,934	0.3166	\$12,009
18	\$37,934	0.2959	\$11,223
19	\$37,934	0.2765	\$10,489
20	\$37,934	0.2584	\$9,803
21	\$37,934	0.2415	\$9,162
22	\$37,934	0.2257	\$8,562
23	\$37,934	0.2109	\$8,002
24	\$37,934	0.1971	\$7,479
25	\$37,934	0.1842	\$6,989
26	\$37,934	0.1722	\$6,532
27	\$37,934	0.1609	\$6,105
28	\$37,934	0.1504	\$5,705
29	\$37,934	0.1406	\$5,332
30	\$37,934	0.1314	\$4,983

PERIODIC COSTS CALCULATIONS

Single Expenditure at Year XX

Interest Rate	7.00%
Net Present Value	\$6,204,782

Year	Investment	Factor	NPV	
0	\$2,280,000	1.0000	\$2,280,000	initial bed construction
1	\$0	0.9346	\$0	
2	\$1,900,000	0.8734	\$1,659,534	closure of existing bed
3	\$0	0.8163	\$0	
4	\$0	0.7629	\$0	
5	\$0	0.7130	\$0	
6	\$0	0.6663	\$0	
7	\$0	0.6227	\$0	
8	\$0	0.5820	\$0	
9	\$0	0.5439	\$0	
10	\$1,980,000	0.5083	\$1,006,532	new bed
11	\$890,000	0.4751	\$422,833	closure
12	\$0	0.4440	\$0	
13	\$0	0.4150	\$0	
14	\$0	0.3878	\$0	
15	\$0	0.3624	\$0	
16	\$0	0.3387	\$0	
17	\$0	0.3166	\$0	
18	\$0	0.2959	\$0	
19	\$0	0.2765	\$0	
20	\$1,980,000	0.2584	\$511,670	new bed
21	\$890,000	0.2415	\$214,947	closure
22	\$0	0.2257	\$0	
23	\$0	0.2109	\$0	
24	\$0	0.1971	\$0	
25	\$0	0.1842	\$0	
26	\$0	0.1722	\$0	
27	\$0	0.1609	\$0	
28	\$0	0.1504	\$0	
29	\$0	0.1406	\$0	
30	\$0	0.1314	\$0	
31	\$890,000	0.1228	\$109,268	closure

**Alternative 5
Option D**

**Bunker Hill
Acid Mine Drainage
Onsite Landfill - Smelter Closure Area
Order of Magnitude Cost Opinion**

**DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin**

DESCRIPTION	QTY	QTY Reduced by 20%	UNIT	TOTAL UNIT COST	TOTAL COST
0.80					
Sitework					
Clear and Grub	20		AC	3,000.00	\$60,000
Site Prep Excavation	300,000	240,000	CY	3.30	\$792,000
Site Prep Fill	300,000	240,000	CY	1.10	\$264,000
Pipeline					
6" HDPE Gravity Pipeline in Trench	2,500		LF	22.50	\$56,249
Manhole	8		EA	3,850.00	\$32,083
Landfill Construction					
Excavation	58,000	46,400	CY	3.30	\$153,120
Subgrade Preparation	12.7	10.2	AC	3,300.00	\$33,528
Subgrade Stabilization	20,537	16,430	CY	4.40	\$72,290
Embankment Fill	63,265	50,612	CY	11.00	\$556,732
Liner Protection Sand	18,000	14,400	CY	19.80	\$285,120
Drain Rock	5,100	4,080	CY	19.80	\$80,784
Ditch Lining Geotextile	35,400	28,320	SY	1.82	\$51,401
G C L	35,400	28,320	SY	4.46	\$126,166
H D P E Geomembrane	35,400	28,320	SY	5.94	\$168,221
H D P E Pipe, 12"	2,000	1,600	LF	28.60	\$45,760
Erosion Control Matting	19,500	15,600	SY	1.65	\$25,740
Perf Pipe, 6"	650	520	LF	3.30	\$1,716
Strip Drains	1,180	944	LF	1.93	\$1,817
Filtrate Penetration Sump (Allowance)	1		EA	27,500.00	\$27,500
HDPE Pipe, 6"	150	120	LF	2.75	\$330
Water Tight Manhole	1		EA	3,850.00	\$3,850
Cleanouts	2		EA	825.00	\$1,650
Chain Link Fence and Gates	3,060		LF	13.20	\$40,392
Groundwater Monitoring Wells	4		EA	6,600.00	\$26,400
Crushed Rock Surfacing	2,270		CY	16.50	\$37,455
SUBTOTAL					\$2,944,304
MISC ALLOWANCE	10%				\$294,430
SUBTOTAL					\$3,238,734
CONTINGENCY	15%				\$485,810
SUBTOTAL					\$3,724,545
MOBILIZATION	15%				\$558,682
CONSTRUCTION TOTAL					\$4,283,226
SALES TAX ON MATERIALS	5%				\$40,586
ENGINEERING AND SUPPORT	20%				\$856,645
CONSTRUCTION MANAGEMENT	8%				\$342,658
CAPITAL TOTAL (ROUNDED)					\$5,523,000

**Alternative 5
Option D**

**Bunker Hill
Acid Mine Drainage
Onsite Landfill - Smelter Closure Area
Order of Magnitude Cost Opinion**

**DATE: 11/29/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Hedglin**

DESCRIPTION	QTY	QTY Reduced by 20%	UNIT	TOTAL UNIT COST	TOTAL COST
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0.80

ANNUAL O&M COST	\$86,000
CAPITAL COST OF CLOSURE @ YEAR 31	\$1,818,000

NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)	\$1,068,000
NPV OF CLOSURE COST (YEAR 31 @ 7% INTEREST)	\$223,000

TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST	\$6,814,000
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NOTES:

Landfill post-closure costs are not included here since they extend beyond the 30 year period.
Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

SLUDGE LANDFILL O & M COST ESTIMATE DETAILS

BH-AMD-Sludge Alt 5 Opt D Flat LF O&M.xls

**Alternative 5
Option D**

**Bunker Hill
Acid Mine Drainage
Dewatering in Sludge Drying Beds
Order of Magnitude Cost Opinion (Reduced by 20%)**

**DATE: 12/16/1998
PROJECT NO.: 148562.02.01
ESTIMATE BY: D. Hedglin**

DESCRIPTION	QTY	QTY Reduced by 20%	UNIT	TOTAL UNIT COST	TOTAL COST
0.8					
Sitework/Yard Piping					
6" HDPE Sludge Pipeline in Trench	800		LF	21.54	\$17,233
6" HDPE Leachate Pipeline in Trench	800		LF	21.54	\$17,233
Sludge Pumping					
Prefab Metal Bldg w/Concrete Floor	216		SF	150.00	\$32,400
Paint	1		LS	5,000.00	\$5,000
Pump, 30hp	2		EA	14,810.06	\$29,620
Standby Pump, 30hp	1		EA	14,810.06	\$14,810
Gland Seal Water Pump	1		EA	7,948.38	\$7,948
Electrical/I&C	1		LS	17,955.71	\$17,956
Sludge Drying Bed					
Excavation	7000	5600	C. Y.	3.00	\$16,800
Subgrade Preparation	2.6	2.08	Acres	3,000.00	\$6,240
Subgrade Stabilization	4200	3360	C. Y.	4.00	\$13,440
Liner Protection Sand	5,000	4000	C. Y.	10.00	\$40,000
Drain Rock	1250	1000	C. Y.	18.00	\$18,000
Ditch Lining Geotextile	2,000	1600	S. Y.	1.65	\$2,640
G C L	10,000	8000	S. Y.	4.05	\$32,400
H D P E Geomembrane	10,500	8400	S. Y.	5.40	\$45,360
H D P E Pipe, 10"	450	360	L. F.	23.00	\$8,280
Erosion Control Matting	8,000	6400	S.Y.	1.50	\$9,600
Perf Pipe, 4"	1600	1280	L. F.	2.00	\$2,560
Perf Pipe, 6"	400	320	L. F.	3.00	\$960
HDPE Pipe, 6"	250	200	L. F.	2.50	\$500
Strip Drains	850	680	L. F.	1.75	\$1,190
Valves, 6" Knife Gate	2		Each	700	\$1,400
Valves, 10" Knife Gate	4		Each	1,000.00	\$4,000
Air/Vacuum Release Valve	1		Each	2,000.00	\$2,000
Valve Vault	6		Each	1,950.00	\$11,700
Water Tight Manhole	2		Each	3,500.00	\$7,000
Vertical Filtrate Drains	8		Each	4,000.00	\$32,000
Cleanouts	4		Each	750.00	\$3,000
Perimeter Road Embankment	8000		C. Y.	10.00	\$80,000
Chain Link Fence and Gates	2000		L.F.	12.00	\$24,000
Access Road (CCP)	500		L.F.	50.00	\$25,000
Crushed Rock Surfacing	1500		C. Y.	15.00	\$22,500
Decontamination Station	1		LS	200,000.00	\$200,000
SUBTOTAL					\$752,770
MISC ALLOWANCE	10%				\$75,277
SUBTOTAL					\$828,047
CONTINGENCY	15%				\$124,207
SUBTOTAL					\$952,254
MOBILIZATION	15%				\$142,838
CONSTRUCTION TOTAL					\$1,095,092
SALES TAX ON MATERIALS	5.0%				\$12,859
ENGINEERING AND SUPPORT	20%				\$219,018
CONSTRUCTION MANAGEMENT	8%				\$87,607

Alternative 5
Option D

Bunker Hill
Acid Mine Drainage
Dewatering in Sludge Drying Beds
Order of Magnitude Cost Opinion (Reduced by 20%)

DATE: 12/16/1998
PROJECT NO.: 148562.02.01
ESTIMATE BY: D. Hedglin

DESCRIPTION	QTY	QTY Reduced by 20%	UNIT	TOTAL UNIT COST	TOTAL COST
		0.8			
CAPITAL TOTAL (ROUNDED)					\$1,415,000
ANNUAL O&M COST				\$43,000	
NPV OF ANNUAL O&M COSTS (30 YEARS @ 7% INTEREST)					\$528,000
TOTAL 30-YEAR PRESENT WORTH COST @ 7% INTEREST					\$1,943,000

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in December 1998 dollars and does not include escalation.
The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

**Alternative 2
Option D**

SLUDGE DRYING BEDS O & M COST ESTIMATE DETAILS

Description	Qty	Unit	Unit Cost	Total Cost
<u>Annual Costs</u>				
Pump Station & Pipeline				
Operation Labor	1	YR	\$22,000	\$22,000
Pump & Pipeline Maintenance & Repairs	1	YR	\$8,618	\$8,618
Power Cost for Pumping & Misc	16,000	kWHR	\$0.06	\$880
Filtrate Discharge System Inspect/Clean	4	EA	\$1,100	\$4,400
Roads Maintenance	1	EA	\$2,750	\$2,750
			Subtotal	\$38,648
				\$3,865
Contingency	10%			
Total Annual Cost				\$42,513



**Alternative 5
Option D**

**Bunker Hill
Acid Mine Drainage
Closure of Existing Sludge Bed on CIA
Order of Magnitude Cost Opinion**

**DATE: 11/22/2000
PROJECT NO.: 152215.FS.02
ESTIMATE BY: D. Bunte
N. Gulensoy**

DESCRIPTION	QTY	UNIT	TOTAL UNIT COST	TOTAL COST
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Closure of Existing Sludge Bed on CIA

Cell Closure Allowance	6.50	AC	137,500.00	\$893,750
SUBTOTAL				\$893,750
MISC ALLOWANCE	10%			\$89,375
SUBTOTAL				\$983,125
CONTINGENCY	30%			\$294,938
SUBTOTAL				\$1,278,063
MOBILIZATION	15%			\$191,709
CONSTRUCTION TOTAL				\$1,469,772
SALES TAX ON MATERIALS	5.0%			\$20,313
ENGINEERING AND SUPPORT	20%			\$293,954
CONSTRUCTION MANAGEMENT	8%			\$117,582
CAPITAL TOTAL (ROUNDED)				\$1,900,000
ANNUAL O&M COST (considered incidental to rest of CIA)			\$0	

NOTES:

Misc Allowance markup is to include items known to exist but cannot be quantified at this time.
Contingency is for scope changes that are presently unforeseen.
Mobilization includes bonds, insurance, temporary facilities, health & safety, demobilization, etc.

NOTE: The above cost opinion is in November 2000 dollars and does not include escalation. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of preparation. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from those presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.



ALTERNATIVE 5
Bunker Hill Mine Water RI/FS
Performance Monitoring Costs

Tasks	Qty	Unit	Material Unit Cost	Labor Unit Cost	Equip Unit Cost	Annual Cost	Comments
Annual Costs							
KT Portal (flow and chemistry) (Years 1 through 30)							
KT Flow Data Management & Reporting	1	MO	0	800	0	\$9,600	Monthly data management; asm 10 hrs/month (1 person) @ \$80/hr labor
KT Sampling and Analysis	1	WK	300	0	0	\$15,600	Weekly sample collection; asm analysis cost of \$300/sample for Cd, Pb, Zn, SO4, LD/SF
Sample Collection Supplies	1	YR	500	0	0	\$500	Allowance
Sample Shipment	1	YR	500	0	0	\$500	Allowance
Subtotal						\$16,600	
Allowance	10%					\$1,660	
Total Annual Cost						\$18,260	
CTP (flow and chemistry) (Years 1 through 30)							
	1	Day	150	0	0	\$54,750	Total, Cd, Pb, and Zn low level analysis
Subtotal						\$54,750	
Allowance	10%					\$5,475	
Total Annual Cost						\$60,225	
Surface Streams (flow only) (Years 1 through 5)							
Automatic Flow Recorder Data Download	1	MO	0	1,280	0	\$15,360	Monthly data download from 3 flow recorders and 8 piezometers; asm 16 hrs/month (2 persons, 1 field day) @ \$80/hr labor
Flow Data Recording & Management for surface water diversions	1	MO	0	320	0	\$3,840	Monthly data management; asm 4 hrs/month (1 person) @ \$80/hr labor
Data management & reporting for existing piezometers	1	MO	0	640	0	\$7,680	Monthly data management and reporting; asm 8 hrs/month (1 person) @ \$80/hr labor
Subtotal						\$26,880	
Allowance	10%					\$2,688	
Total Annual Cost						\$29,568	
In-Mine (flow and chemistry) (Years 1 through 5)							
Sample Collection	15	Event	0	3,840	0	\$57,600	15 events, 48 hrs/event (3 persons, 2 field days) @ \$80/hr labor
Sample Collection Materials	15	Event	0	0	0	\$2,000	Allowance
Sample Preparation and Packaging	15	Event	0	2,560	0	\$38,400	15 events, 32 hrs/event (2 persons, 2 days) @ \$80/hr labor
Sample Shipment	15	Event	100	0		\$1,500	
Sample Analysis	15	Event	5,600	0	0	\$84,000	15 events, 14 samples/event, \$400/sample for analytical (total and dissolved metals, sulfate, lime demand, solids formed, TSS)
Data management, interpretation, QA/QC and reporting	15	Event	0	640	0	\$9,600	15 events, 8 hrs/event, @ \$80/hr labor
Subtotal						\$193,100	
Allowance	10%					\$19,310	
Total Annual Cost						\$212,410	